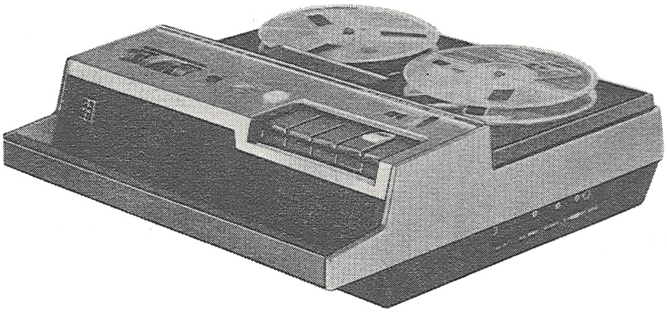
NATIONAL

TAPE RECORDER
SERVICE MANUAL



MODEL RQ-158S

AUTOMATIC REVERSE
AND
VOICE OPERATION TAPE RECORDER

CONTENTS

SPECIFICATIONS 1
PARTS LOCATION 1
BLOCK DIAGRAM OF ELECTRICAL CIRCUITS 2
DISASSEMBLY INSTRUCTION 3
MECHANICAL OPERATING CONTROLS 4
MECHANICAL ADJUSTMENTS 7
AMPLIFIER ADJUSTMENTS 8
REPLACEMENT PARTS LIST 10
TROUBLE SHOOTING GUIDE 14
EXPLODED VIEWS 18
EXPLANATIONS ON CIRCUITS 22
CIRCUIT BOARD 25
WIRING CONNECTION DIAGRAM 27
SCHEMATIC CIRCUIT DIAGRAM 28
ELECTRICAL PARTS LOCATION 29
CABINET PARTS 29
ACCESSORIES 31
COMPONENT PACKING 32

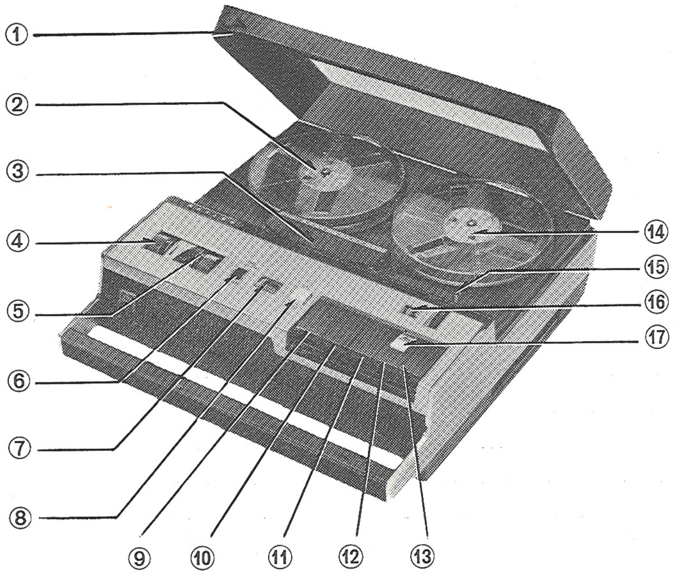
MATSUSHITA ELECTRIC

JAPAN

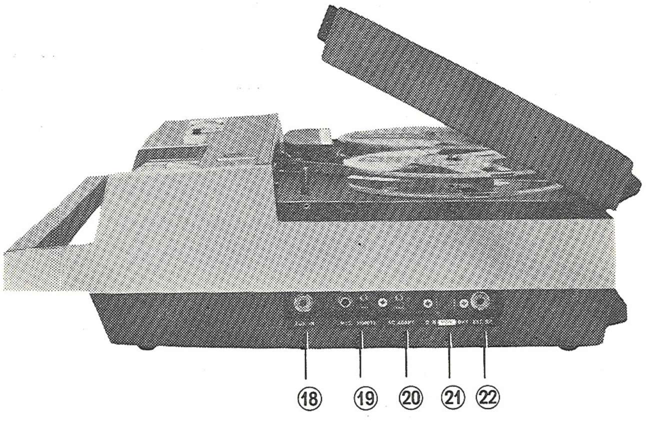
SPECIFICATIONS

Power Source:	Battery: 9 V (6 "D" size Batteries)
Audio Output:	1.2 W (1.5 W maximum)
Transistors:	2SB 173(1) 2SB 175(4) 2SB 176(1) 2SB 324(2) 2SB 172(1)
Recording System:	AC. Bias 35K Cycles
Erasure System:	DC. Erase
Track System:	Automatic Reverse 2 Track System
Monitor System:	Sound Monitor
Tape Speeds:	3-3/4 ips. and 1-7/8 ips.
Frequency Response:	120~8,000 c/s at 3-3/4 ips. 120~5,000 c/s at 1-7/8 ips.
Input Impedance:	Microphone 8 KΩ Auxiliary 80 KΩ AC. Adaptor 9V
Output Impedance:	Extension Speaker Jack "EXT.SP" 8 Ω
Playing Time:	1 hour at 3-3/4 ips. with 5″ Tape (600 ft) 2 hours at 1-7/8 ips. with 5″ Tape (600 ft)
Battery Life:	More than 15 hours (using NATIONAL "Hi-Top" Batteries)
Recording Level Indicator:	VU. Meter
Built-in Speaker:	6″×3-1/4″ Dynamic Speaker
Dimensions:	11-3/4″(W)×13″(D)×3-3/8″(H)
Weight:	About 10 lbs. without Batteries

PARTS LOCATION



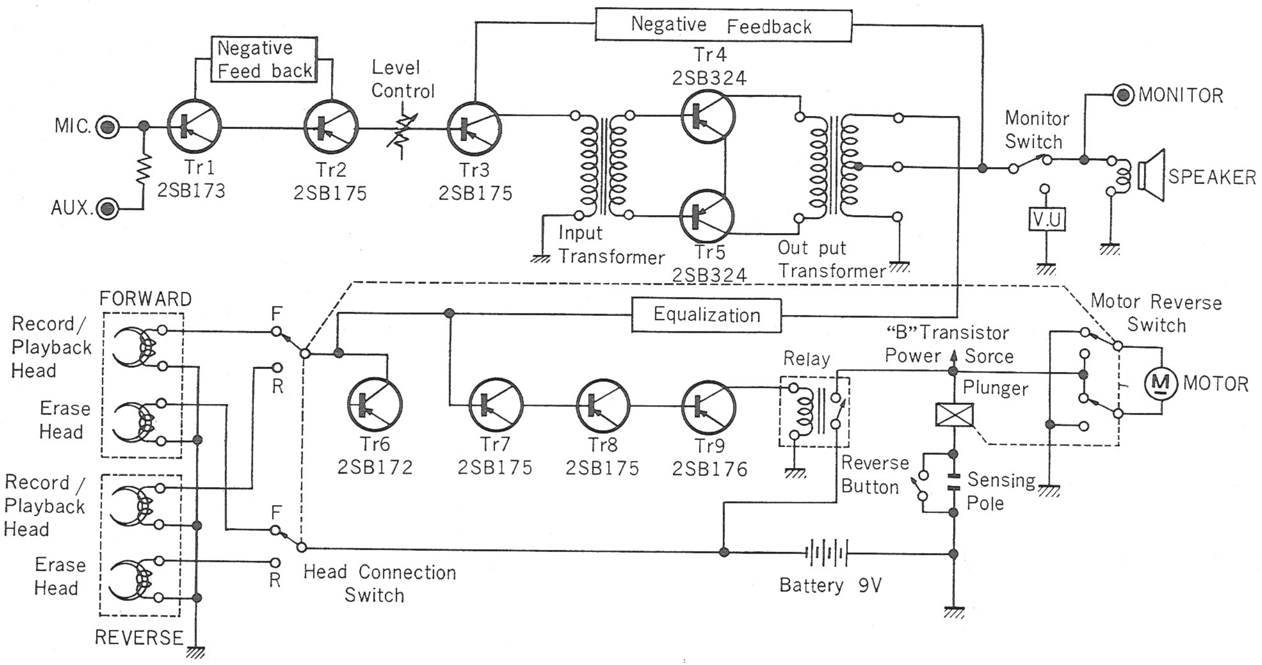
① Case Lid
② Left Reel Table
③ Head Cover
④ Volume Control Knob
⑤ Tone Control Knob
⑥ Voice Operation Switch
⑦ Level Indicator
⑧ "CUE" (Instant Stop) Button
⑨ Rewind Push Button
⑩ Stop Push Button
⑪ Fast Forward Push Button
⑫ Play Push Button
⑬ Record Push Button
⑭ Right Reel Table
⑮ Capstan Sleeve Rest
⑯ Tape Countor
⑰ Reverse Push Button



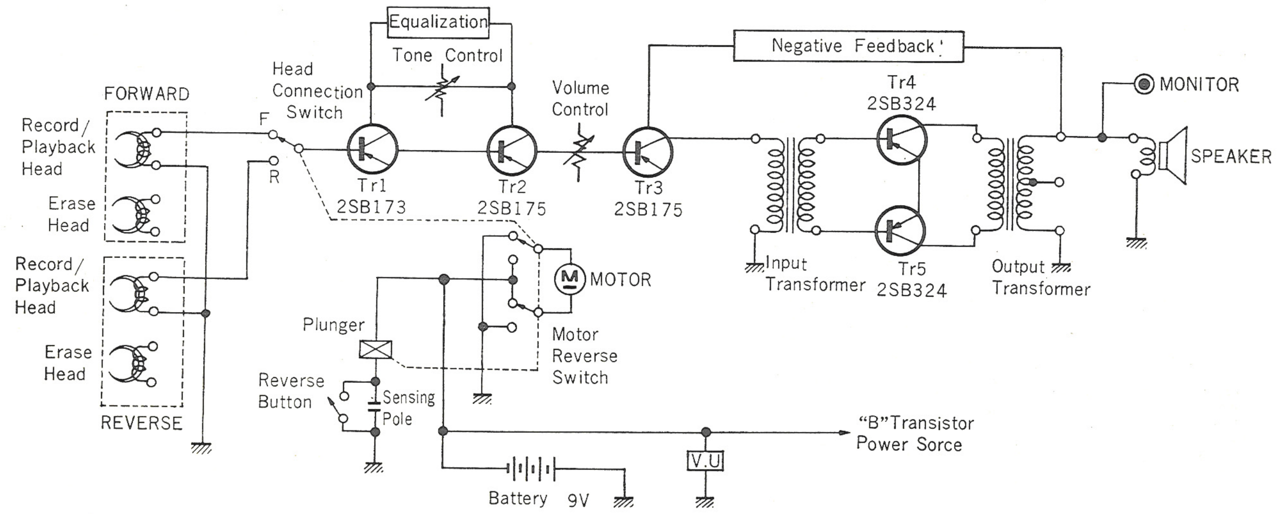
⑱ Auxiliary Input Jack
⑲ Microphone and Remote Control Jack
⑳ AC. Adaptor Jack
㉑ Sound Monitor Switch
㉒ Earphone and EXT. SP. Jack

BLOCK DIAGRAM OF ELECTRICAL CIRCUITS

RECORDING CIRCUIT

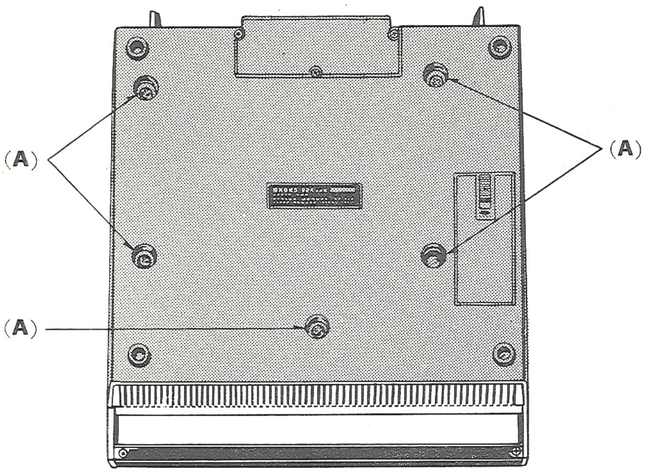

Negative Feedback
Negative Feed back
Level Control
Tr4 2SB324
MONITOR
Monitor Switch
SPEAKER
MIC.
AUX.
Tr1 2SB173
Tr2 2SB175
Tr3 2SB175
V.U
Input Transformer
Tr5 2SB324
Out put Transformer
FORWARD
Record/ Playback Head
Erase Head
F
R
Equalization
Motor Reverse Switch
"B" Transistor Power Sorce
Relay
Plunger
MOTOR
Tr6 2SB172
Tr7 2SB175
Tr8 2SB175
Tr9 2SB176
Reverse Button
Sensing Pole
Record / Playback Head
Erase Head
Head Connection Switch
Battery 9V
REVERSE

PLAYBACK CIRCUIT


Equalization
Tone Control
Negative Feedback
Head Connection Switch
FORWARD
F
R
Volume Control
Tr4 2SB324
MONITOR
SPEAKER
Record/ Playback Head
Erase Head
Tr1 2SB173
Tr2 2SB175
Tr3 2SB175
MOTOR
Input Transformer
Tr5 2SB324
Output Transformer
Record/ Playback Head
Plunger
Motor Reverse Switch
Erase Head
Reverse Button
Sensing Pole
REVERSE
"B" Transistor Power Sorce
V.U
Battery 9V

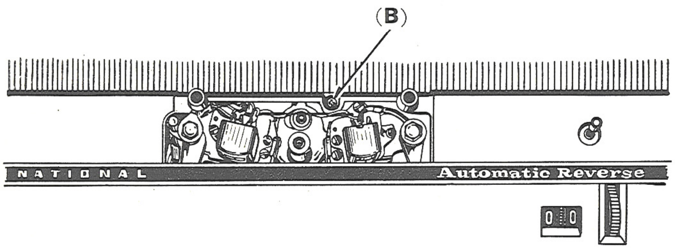
DISASSEMBLY INSTRUCTIONS

BOTTOM COVER

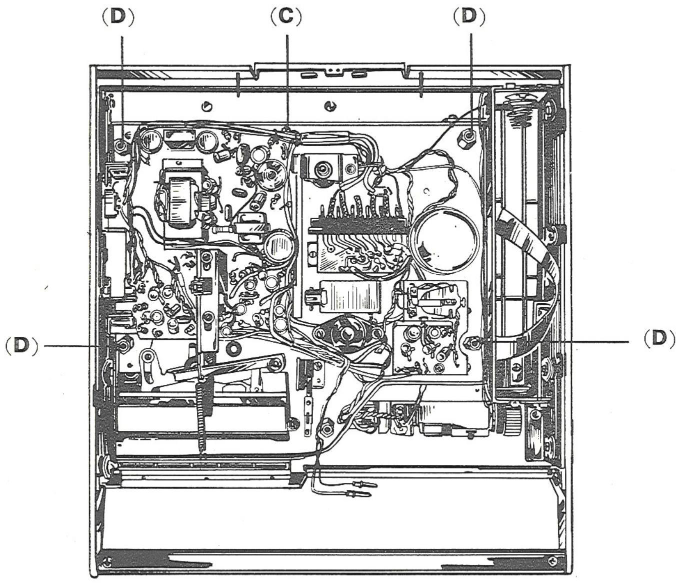


1. Turn over the Main Cabinet Body.
2. Remove 5 screws (A) holding Bottom Cover.
3. Pull out Speaker lead wires.

MAIN CABINET BODY CASE

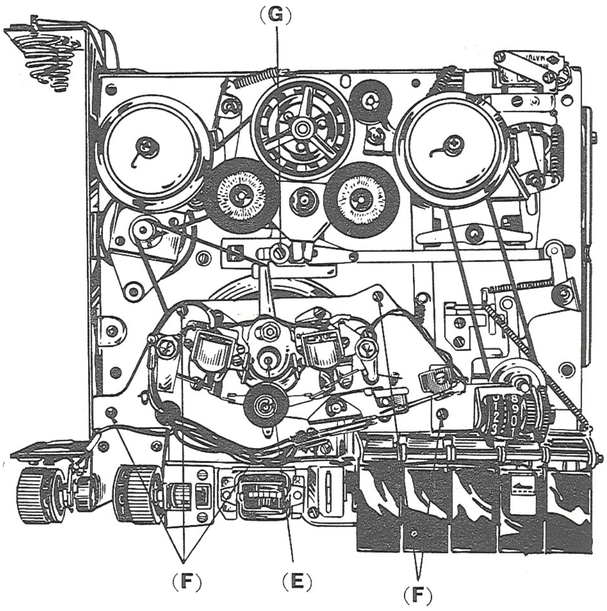


1. Remove Head Cover.
2. Remove screw (B) under the Head Cover.
3. Remove Bottom Cover.
   (Refer to Bottom Cover)



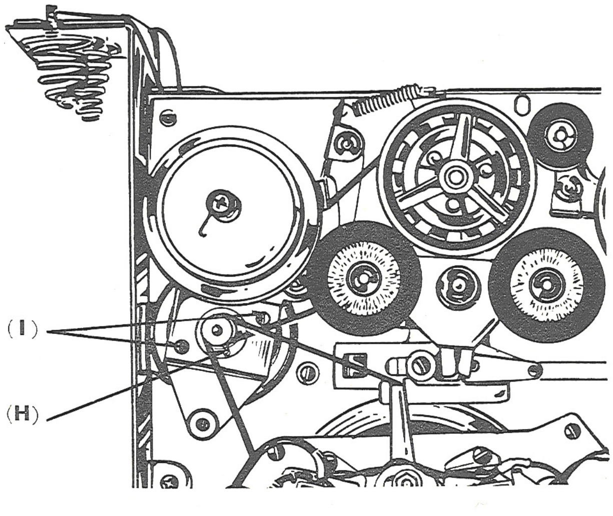
4. Remove 5 Chassis Mounting Screws (C) and (D).

FLYWHEEL



1. Remove Capstan Sleeve (E) from Capstan.
2. Unscrew and remove screws (F) from the Upper Baseplate, and remove Baseplate.
3. Unscrew and remove screw (G) from the Slide Switch Rod and move the Rod toward the Reel Table.
4. Carefully remove the Flywheel. In this instance, care must be taken not lose the Thrust Steel Ball put in the Flywheel Shaft Bearing.

MOTOR



1. Loosen screw (H) and remove Motor Pulley.
2. Unscrew and remove screws (I) and remove Motor.

MECHANICAL OPERATING CONTROLS

OPERATION

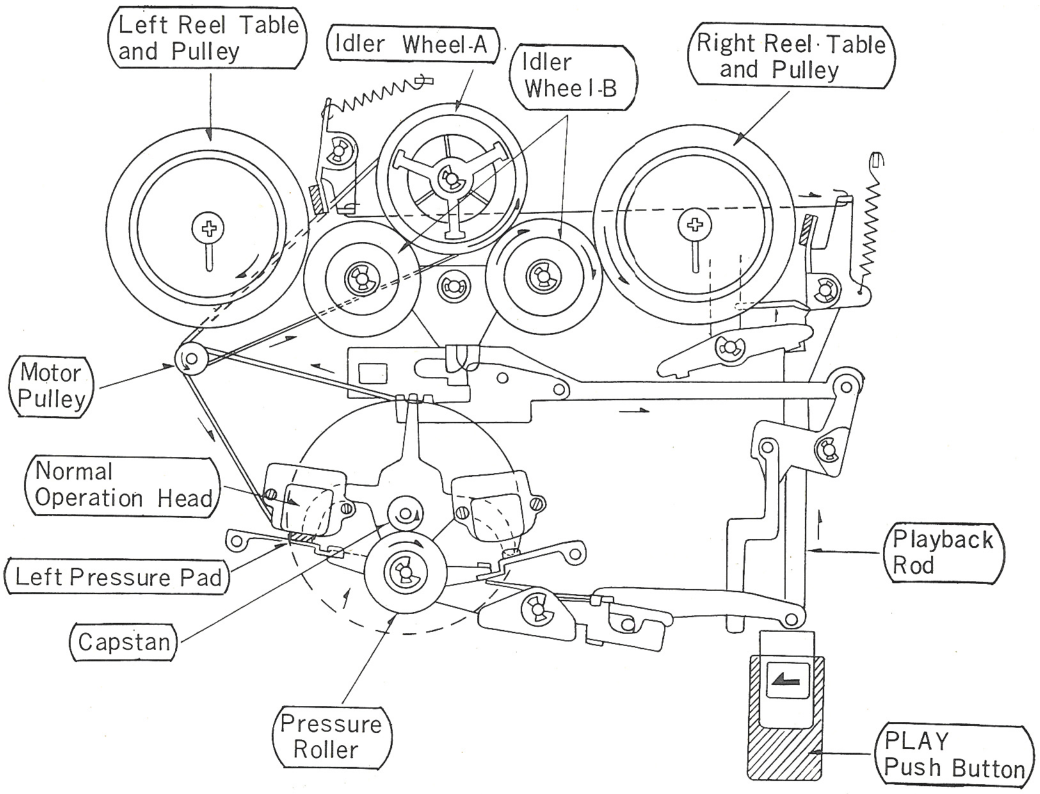
1. Set to required speed by inserting Capstan Sleeve or removing it from Capstan.
2. When "PLAY" Push Button is pressed, the unit is set at "PLAY" mode.
3. When "PLAY" and "RECORD" Push Buttons are pressed simultaneously, the unit is set at "RECORD" mode.
4. When "REWIND" Push Button is pressed, the tape just recorded or played back is rewound rapidly.
5. When "FAST FORWARD" Push Button is pressed, the tape is advanced rapidly.
6. When "CUE" Push Button is pressed, the tape motion stops instatly for cueing and editing purposes.
7. When "REVERSE" Push Button is pressed together with the "PLAY" Push Button, or while the tape is moving in normal forward direction, the tape moves in reverse direction, or the tape direction reverses instantly.

TAPE TRANSPORT CONTROL FUNCTIONS

1. The Buttons are released automatically, when the other Buttons are pressed, except "CUE" Push Button.
2. The "CUE" Push Button is inoperative when unit is set at "FAST FORWARD" or "REWIND" mode.

TAPE TRANSPORT OPERATION

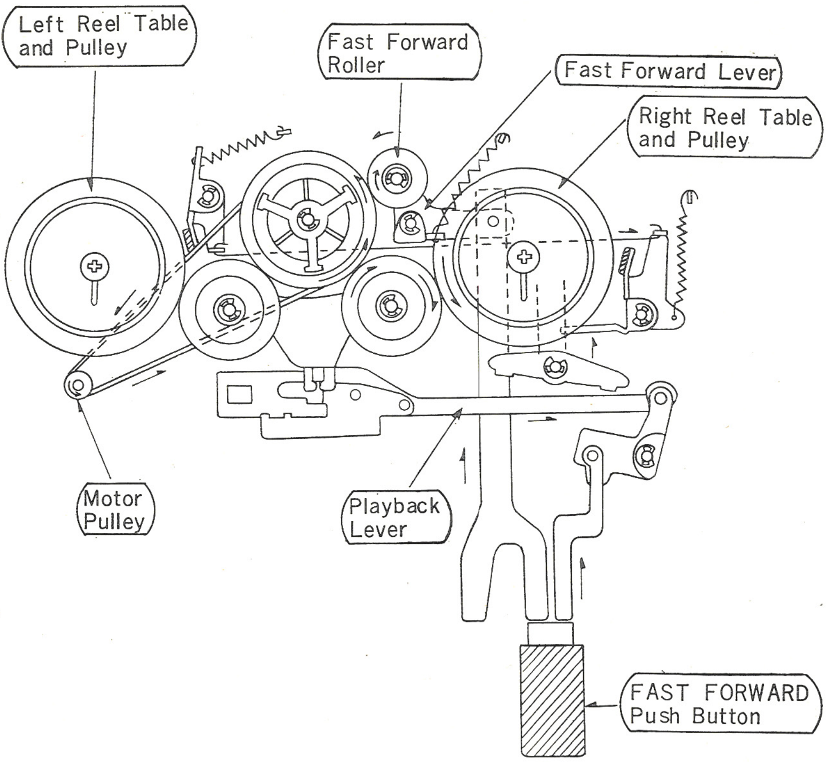
PLAYBACK AND RECORD


Left Reel Table and Pulley
Idler Wheel-A
Idler Wheel-B
Right Reel Table and Pulley
Motor Pulley
Normal Operation Head
Left Pressure Pad
Capstan
Pressure Roller
Playback Rod
PLAY Push Button

When "PLAY" Push Button is depressed, Pressure Roller is pressed against Capstan and the left side Pressure Pad assembly is pressed against Haed. At the same time, Idler Wheel-B contacts Idler Wheel-A, Right Reel Table and Pulley simultaneously causing Right Reel Table to rotate.

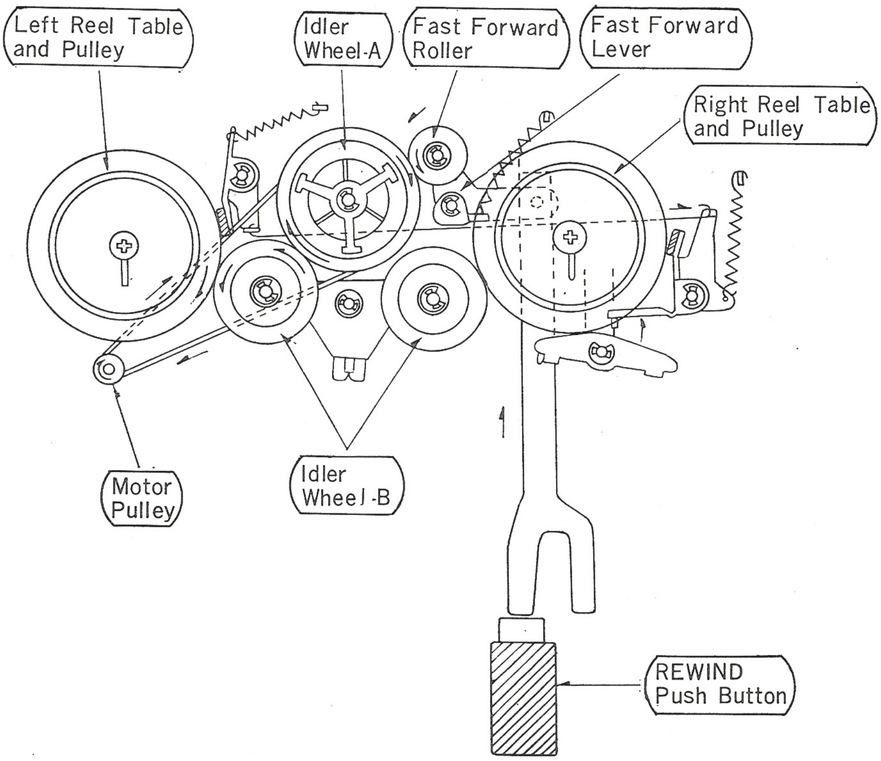
When "PLAY" and "RECORD" Push Buttons are depressed simultaneously, the unit is in the "RECORD" mode, with the mechanism set in the same manner as in the "PLAY" mode.

FAST FORWARD


Left Reel Table and Pulley
Fast Forward Roller
Fast Forward Lever
Right Reel Table and Pulley
Motor Pulley
Playback Lever
FAST FORWARD Push Button

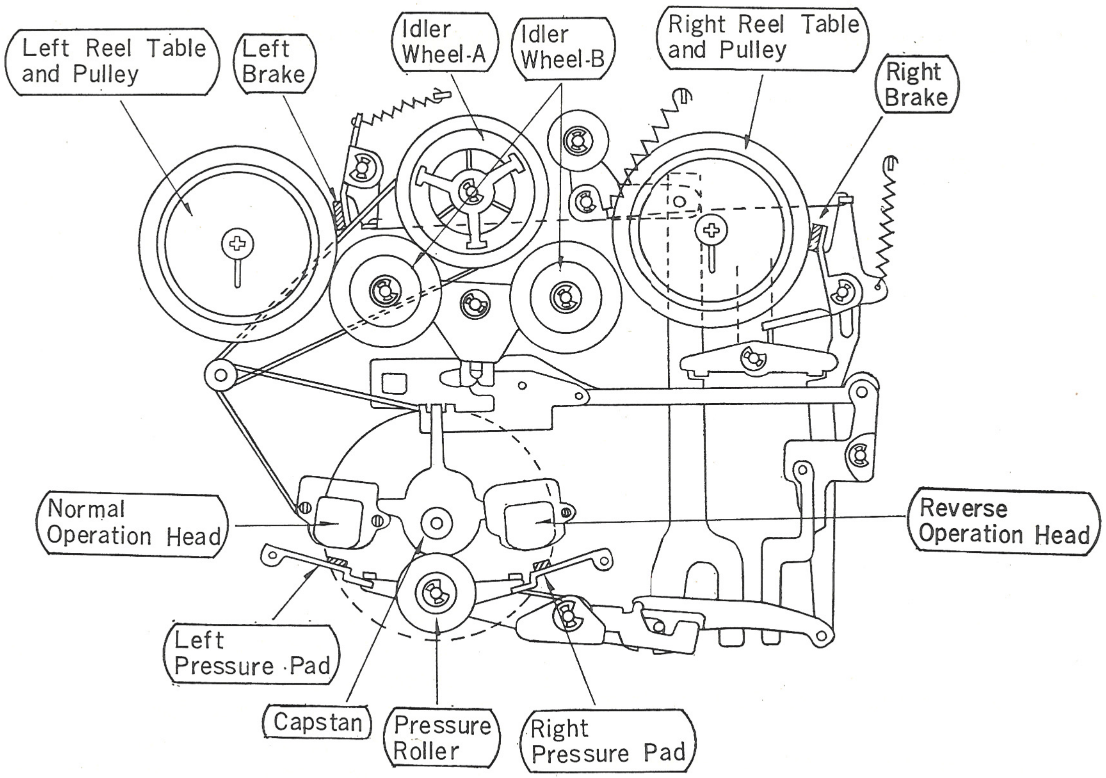
When "Fast Forward" Push Button is depressed, Fast Forward Roller contacts against Idler Wheel-A.
At the same time, Idler Wheel-B contacts against Right Reel Table, Idler Wheel-A and Right Reel Pulley simultaneously causing Right Reel Table to rotate rapidly.

REWIND


Left Reel Table and Pulley
Idler Wheel-A
Fast Forward Roller
Fast Forward Lever
Right Reel Table and Pulley
Motor Pulley
Idler Wheel-B
REWIND Push Button

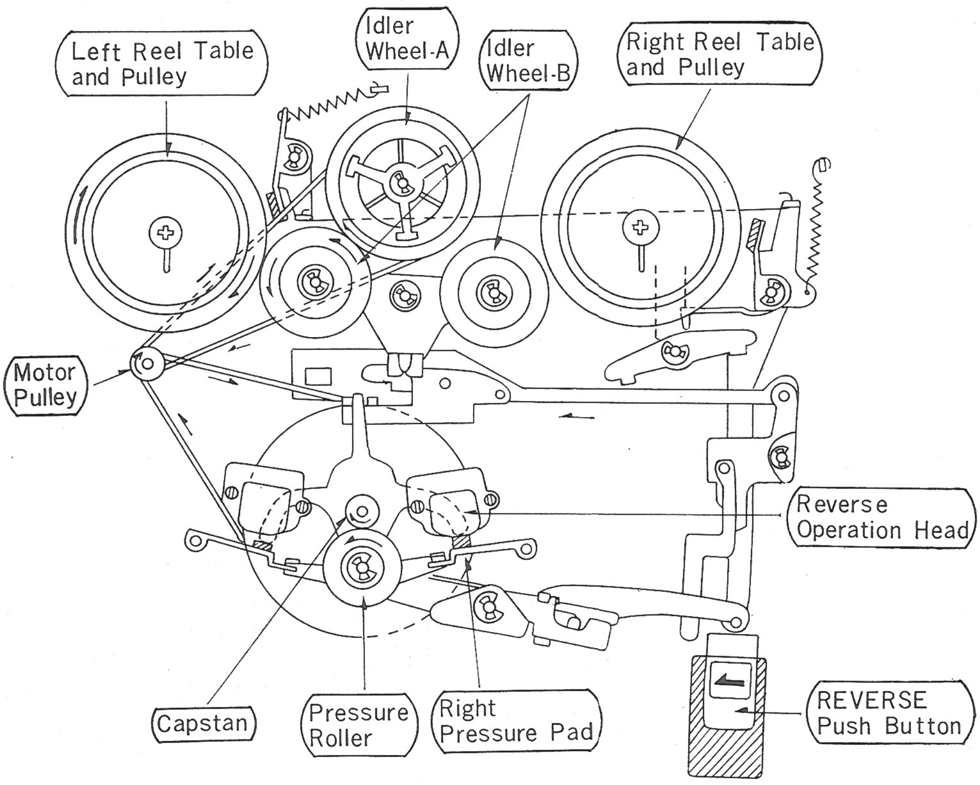
When "REWIND" Push Button is depressed, Fast Forward Roller contacts against Idler Wheel-A and Idler Wheel-B contacts against Left Reel Table causing Left Reel Table to rotate rapidly.

STOP


Left Reel Table and Pulley
Left Brake
Idler Wheel-A
Idler Wheel-B
Right Reel Table and Pulley
Right Brake
Normal Operation Head
Reverse Operation Head
Left Pressure Pad
Capstan
Pressure Roller
Right Pressure Pad

When "STOP" Push Button is depressed, previously engaged Push Button is instantly released. Brakes will stop both Reel Tables and power supply to the unit is cut-off.

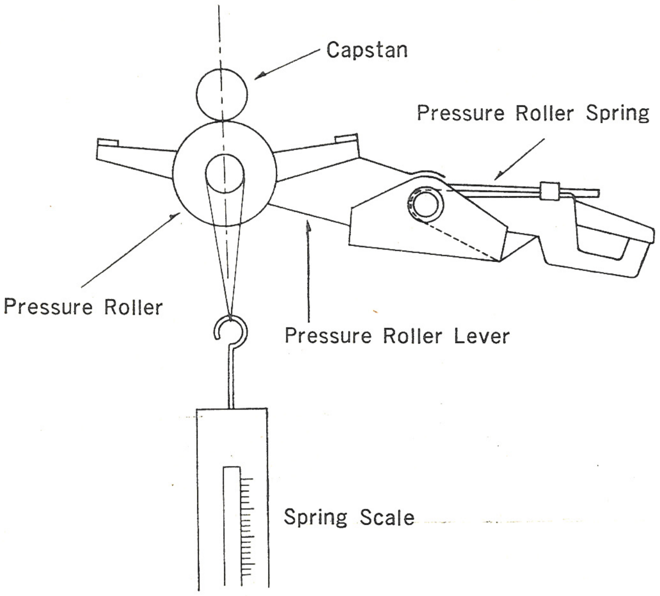
REVERSE


Left Reel Table and Pulley
Idler Wheel-A
Idler Wheel-B
Right Reel Table and Pulley
Motor Pulley
Reverse Operation Head
Capstan
Pressure Roller
Right Pressure Pad
REVERSE Push Button

When "REVERSE" Push Button is pressed or the Auto-Reverse Mechanism is activated by means of contact of the metal sensing foil attached to the tape against tape guide post while unit is in "RECORD" or "PLAY" mode of normal forward direction, Idler Wheel-B contacts against Left Reel Table and Idler Wheel-A.
Simultaneously, right side pressure Pad assembly Presses against Head.

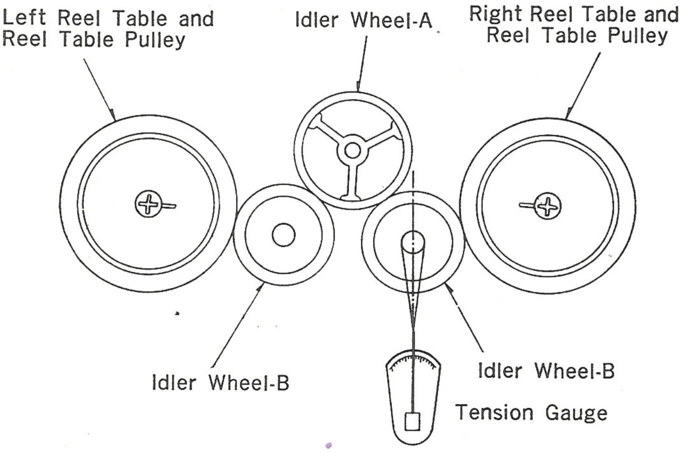
MECHANICAL ADJUSTMENTS

PRESSURE ROLLER TENSION


Capstan
Pressure Roller Spring
Pressure Roller
Pressure Roller Lever
Spring Scale

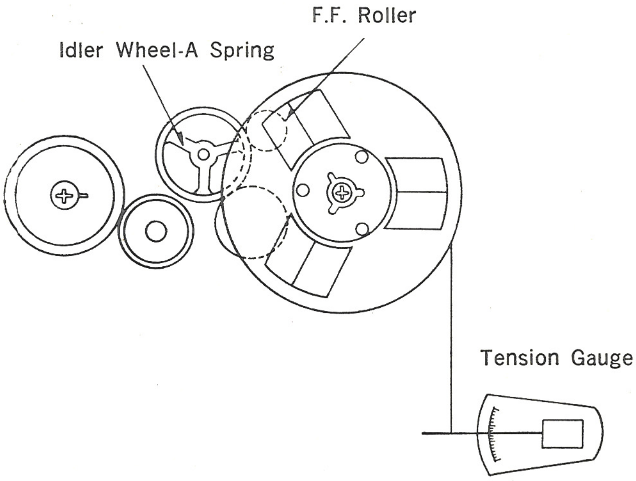
1. Shaft of Pressure Roller must be parallel to shaft of Capstan.
2. Pressure between Capstan and Pressure Roller can be checked as follows:
   a. Set the recorder in PLAY mode with speed set at 1-7/8 ips.
   b. Hook a loop of thread at Pressure Roller Shaft and Spring Scale and pull until Pressure Roller is disengaged from Capstan.
   c. The proper pressure is between 7∼12.4 ozs. (200∼350 g).
   d. If pressure is not within the above range, adjust Pressure Roller Spring.

IDLER TENSION


Left Reel Table and Reel Table Pulley
Idler Wheel-A
Right Reel Table and Reel Table Pulley
Idler Wheel-B
Idler Wheel-B
Tension Gauge

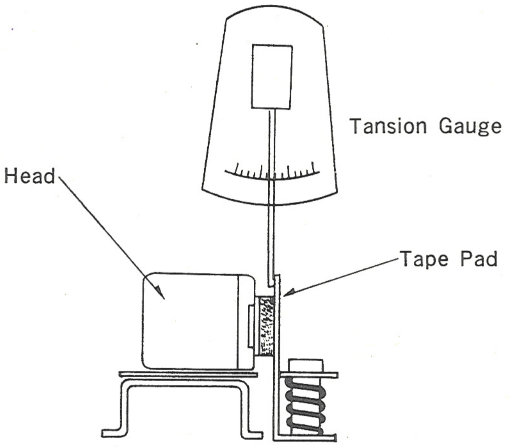
1. Shaft of Idler Wheel-B must be parallel to shafts of Idler Wheel-A and Reel Table Pulley.
2. Pressure between Idler Wheel-B and Idler Wheel-A and Reel Table Pulley can be checked as follows:
   a. Set the recorder in PLAY mode.
   b. Hook a loop of thread as follows and pull until Idler is disengaged from the Idler Wheel-A (conduct for both Idler Wheels).
   c. The proper pressure is between 1.4∼2.5 ozs. (40∼70 g).

WINDING TORQUE


F.F. Roller
Idler Wheel-A Spring
Tension Gauge

1. Place a 5 inch tape reel on either the right or left reel table and hang the end of the tape on a Tension Gauge.
2. Proper tensions are as follows:
   a. PLAY mode..............more than 0.176 ozs. (5 g)
   b. REWIND mode ....more than 0.53 ozs. (15 g)
   c. F.F. mode ....more than 0.53 ozs. (15 g)
3. If tension is less than the above figures, adjust Idler Wheel-A spring for PLAY tension and F.F. spring for F.F. and REWIND tensions.

PRESSURE PAD PRESSURE


Tansion Gauge
Head
Tape Pad

1. Set the unit in PLAY mode.
2. Place a tention gauge at the center of tape pad.
3. Gradually draw the pad from the head until pad is disengaged from head and read the scale.
4. Proper pressure should be 1.05∼1.60 ozs. (30∼45 g).
5. If tension is not within the above range, adjust pad spring.

AMPLIFIER ADJUSTMENTS

RECORD/PLAYBACK HEAD AZIMUTH ADJUSTMENT

Instruments Required: V.T.V.M. Standard Alignment Tape, 8 Ω Resistor.
Measuring Circuit: Refer to Fig. 1.

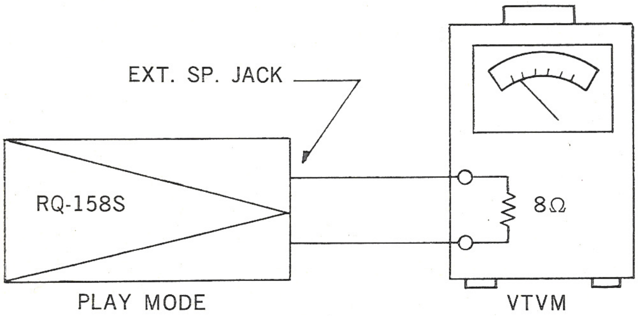

EXT. SP. JACK
RQ-158S
8Ω
PLAY MODE
VTVM

Fig. 1

Measuring Method:

1. As shown in Fig. 1, connect V.T.V.M. to Extension Speaker Jack of model RQ-158S and terminate with 8 Ω resistor.
2. Thread Standard Alignment Tape (azimuth adjustment part) and set recorder to PLAYBACK mode.
3. Turn head adjustment screw for maximum reading at V.T.V.M.
4. After completion of above adjustment, lock screw with paint.
5. Adjust levels of heads (in relation to Erase Head) as in Fig. 2. For quick check, lift pressure pad assemblies with fingers and note position of tape in relation to heads.

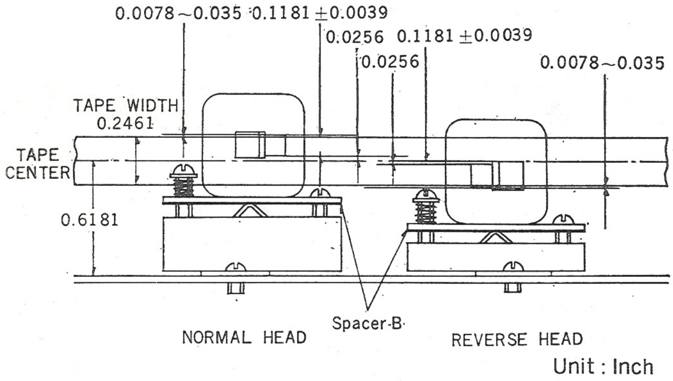

0.0078~0.035
0.1181±0.0039
0.0256
0.1181±0.0039
0.0256
0.0078~0.035
TAPE WIDTH 0.2461
TAPE CENTER
0.6181
NORMAL HEAD
Spacer-B
REVERSE HEAD
Unit : Inch

Fig. 2

NOTE: A. The levels of heads are to be adjusted by spacer-B, so place the proper number of spacers according to the color code indicated on the head.

Color code on the head	No. of spacers required
Red	2 pcs.
None	1 pc.
Black	Nil

B. Care must be taken in mounting the head assembly for the reverse operation. The erase record and playback slits on the "reverse head assembly are located in reverse positions in comparison to the head assembly for "regular" direction Operation.

C. Care must also be taken in checking the pressure pad contact to the head. The pad must be pressed against head correctly (vertically to the head and in parallel to the tape) and also there should not be any difference in tape motion whether the pad is in contact or not, both for normal and reverse operations.

RECORD BIAS FREQUENCY ADJUSTMENT

Instruments Required: Oscilloscope, AF Oscillator, 100 Ω Resistor.
Measuring Circuit: Refer to Fig. 3.

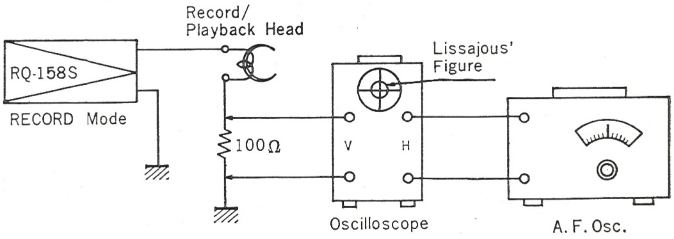

Record/
Playback Head
RQ-158S
RECORD Mode
Lissajous'
Figure
100Ω
V
H
Oscilloscope
A. F. Osc.

Fig. 3

Measuring Method:

1. As shown in Fig. 3, insert a 100Ω resistor to ground lead wire of Record Head and connect vertical axis of Oscilloscope across resistor; connect horizontal axis of Oscilloscope to output terminl of AF Oscillator.
2. When model RQ-158S is set to RECORD mode, connected as above and volume control (VR-2) set at minimum and VR-4 (semi-fixed variable resistor for bias current adjustment) set at center pesitions, Lissajous' figure will appear on the Oscilloscope; refer to this figure to check frequency of bias oscillator. Standard frequency is 30~40 KC.
3. If frequency is not within above range, adjust core of T4 (Bias Oscillator Coil) until above frequency is obtained.

NOTE: The above adjustment must be made for both "normal" and "reverse" operation heads. Also, lock cores with paint after adjustments.

RECORD BIAS CURRENT ADJUSTMENT

Instruments Required: V.T.V.M. 100 Ω Resistor.
Measuring Circuit: Refer to Fig. 4

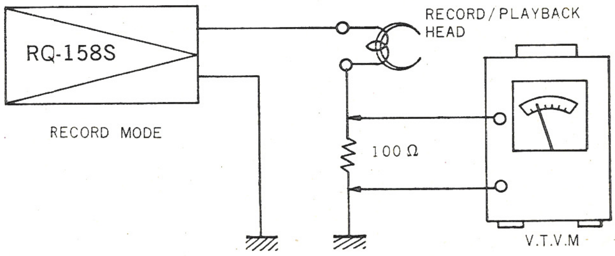

RECORD/PLAYBACK
HEAD
RQ-158S
RECORD MODE
100 Ω
V.T.V.M

Fig. 4

Measuring Method:

1. As shown in Fig. 4, insert 100 Ω resistor to ground lead wire of Record Head and connect VTVM across resistor.
2. When recorder is set to RECORD mode with volume control set at minimum, BIAS (to be fed to Record Head) will be indicated at V.T.V.M.
3. As standard bias current for model RQ-158S is set between 0.6 and 0.8 mA, VTVM reading should be between 60 and 80 mV (0.6～0.8 mA $\times 10^{-3} \times 100\Omega$ =60～80 mV). If out of range, adjust VR-4.

NOTE: The above adjustment must be made for both "normal" and "reverse" operation heads. Record/Playback and Erase heads are connected to assure correct phase relationships, so do not reverse connections to any of the heads, as this will result in an increase in noise and distortion.

ERASE CURRENT ADJUSTMENT

Instruments Required: DC Milliammeter (having range of 0～20 mA or 50 mA).

Measuring Circuit: Refer to Fig. 5

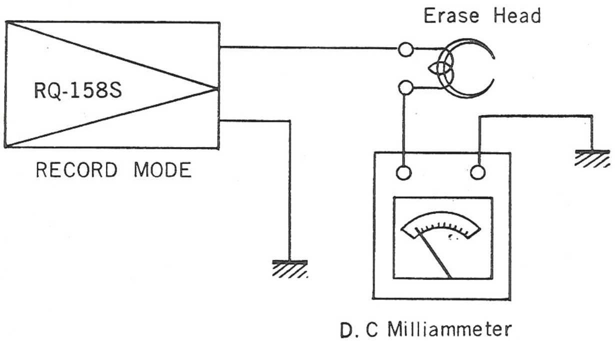


Fig. 5

Measuring Method:

1. Disconnect wiring from ground side of erase head and insert DC Milliammeter between wire and terminal as shown in Fig. 5.
2. When recorder is set to RECROD mode, with volume control (VR-2) set at minimum position, DC Milliammeter will indicate erase current.
3. Standard erase current is between 7～11 mA. If current measured is not within above range replace R-31 resistor (Lower resistance value if current is low and vice versa).

NOTE: DC Milliammeter must be accurate. If "DC Current Range" of regular "VOM" is used, it should be calibrated for accurate reading.

RECORD LEVEL ADJUSTMENT

Instrument Required: AF Oscillator, Attenuator, VTVM, 600 Ω and 100 Ω Resistors.

Measuring Circuit: Refer to Fig. 6.

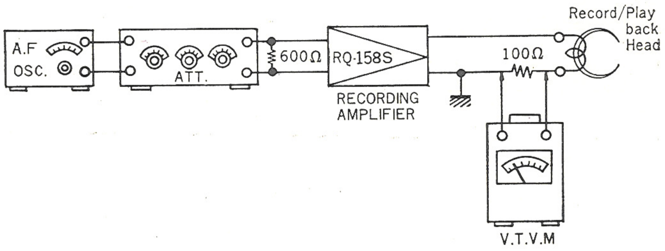


Fig. 6

Measuring Method:

1. Set Monitor Switch (S3) at "OFF". In order to cut-off bias current from oscillator circuit, insert a paper between the contacts of Bias Cut-off Switch (S10).
2. As shown in Fig. 6, connect output of AF Oscillator to Microphone Input Jack of model RQ-158S through Attenuator (terminate with 600 Ω if impedance of attenuator is 600 Ω). Disconnect wiring from ground side of Record Head; insert 100 Ω resistor between lead wire and terminal; connect V.T.V.M. across resistor.
3. Set recorder to RECORD mode, with volume control set at maximum and VR-3 (semi-fixed variable resistor for level adjustment) at center positions.
4. Set AF Oscillator output for 1 Kc, adjust attenuator to obtain 50 mV reading at V.T.V.M. Attenuation level at this setting should be −69～−75 db.
5. If attenuation level is not within above range, replace R-10 (Lower resistance value if current is low and vice versa).
6. Also confirm that the Level Meter setting at this moment is −3～3 db.
7. If setting is not within above range, replace R-37 (Lower resistance value if setting is low and vice versa).

NOTE: The above adjustment must be made for both "normal" and "reverse" operation heads.

OVERALL LEVEL BALANCE (between normal and reverse operations) ADJUSTMENT

Instruments Required: AF Oscillator, Attenuator, V.T.T.M. 600 Ω and 8 Ω Resistors.

Measuring Circuit: Refer to Fig. 7

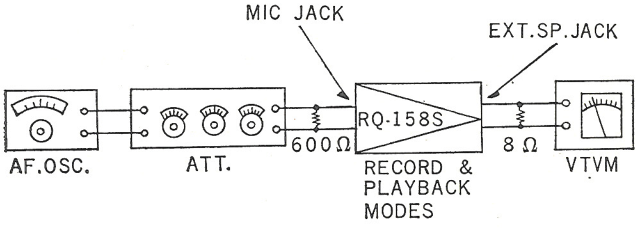


Fig. 7

Measuring Method:

1. As shown in Fig. 7, connect output of AF Oscillator to Microphone Input Jack of model RQ-158S through

Attenuator (terminate with 600 Ω if impedance of attenuator is 600 Ω).

2. Connect V.T.V.M. to Extenion Speaker Jack of model RQ-158S and terminate with 8 Ω resistor.
3. Set the recorder to RECORD mode with tone and volume controls set at maximum positions.
4. Set AF Oscillator output for 1 Kc, adjust attenuator to obtain 0-VU reading at Level Meter and continue attenuation to further attenuate 15 db. Record signals in normal and reverse motions.
5. Playback tape. If the difference of VU meter readings between "normal" and "reverse" forward recording is more than 6 db, adjust VR-3 (semi-fixed variable resistor for level adjustment).

NOTE: The VR-3 is also related to the RECORD LEVEL, so adjust levels in relation to the others.

VOICE OPERATION SENSITIVITY ADJUSTMENT

Instruments Required: AF Oscillator Attenuator, V.T.V.M. 600 Ω and 8 Ω Resistors.

Measuring Circuit: Refer to Fig. 7

Measuring Method:

1. As shown in Fig. 7, connect output of AF Oscillator to Microphone Input Jack of model RQ-158S through Attenuator (terminate with 600 Ω if impedance of attenuator is 600 Ω).
2. Connect VTVM to Extension Speaker Jack of model RQ-158S and terminate with 8Ω resistor.
3. Set the recorder to RECORD mode with tone and volume controls set at maximum positions, monitor switch to "on", and voice control switch to "AUTO".
4. Set AF Oscillator output for 1 Kc, adjust attenuator to obtain 0.3 V reading at V.T.V.M.
5. First, turn VR-6 (semi-fixed variable resistor for voice control sensitivity adjustment) to maximum (extreme clockwise position) and gradually rotate it to counter-clockwise direction and stop rotation as soon as the motor JUST starts rotation.
6. If the motor does not start rotation with 0.3 V output, confirm whether the motor starts rotation with the signal 7 db below 0-VU on the Level Meter with VR-6 set at minimum (extreme counter-clockwise position).
7. If the motor still does not start rotation with the above setting, check voice operation control circuit referring the Trouble Shooting Guide.

REPLACEMENT PARTS LIST

ATTENTION: Please order Replacement Parts according to this Replacement Parts List. The Parts which are not listed up here will not be supplied.
So a Part in an assembly has to be ordered as a whole assembly.

RESISTORS

Ref. No.	Description				Part No.
R 1	Carbon Resistor	8.2 KΩ	1/4 Watt	10%	ERD-14VK822
R 2	Carbon Resistor	270 Ω	1/4 Watt	10%	ERD-14VK271
R 3	Carbon Resistor	82 KΩ	1/4 Watt	10%	ERD-14VK823
R 4	Carbon Resistor	18 KΩ	1/4 Watt	10%	ERD-14VK183
R 5	Carbon Resistor	2.2 KΩ	1/4 Watt	10%	ERD-14VK222
R 6	Carbon Resistor	47 Ω	1/4 Watt	10%	ERD-14VK470
R 7	Carbon Resistor	33 KΩ	1/4 Watt	10%	ERD-14VK333
R 8	Carbon Resistor	3.3 KΩ	1/4 Watt	10%	ERD-14VK332
R 9	Carbon Resistor	10 KΩ	1/4 Watt	10%	ERD-14VK103
R 10	Carbon Resistor	180 KΩ	1/4 Watt	10%	ERD-14VK184
R 11	Carbon Resistor	2.7 KΩ	1/4 Watt	10%	ERD-14VK272
R 12	Carbon Resistor	47 KΩ	1/4 Watt	10%	ERD-14VK473
R 13	Carbon Resistor	10 KΩ	1/4 Watt	10%	ERD-14VK103
R 14	Carbon Resistor	2.2 KΩ	1/4 Watt	10%	ERD-14VK222
R 15	Carbon Resistor	1 KΩ	1/4 Watt	10%	ERD-14VK102
R 16	Carbon Resistor	15 KΩ	1/3 Watt	10%	ERD-14VK153
R 17	Carbon Resistor	1.8 KΩ	1/4 Watt	10%	ERD-14VK182
R 18	Carbon Resistor	180 Ω	1/4 Watt	10%	ERD-14VK181
R 19	Carbon Resistor	18 Ω	1/4 Watt	10%	ERD-14VK180
R 20	Carbon Resistor	1.2 KΩ	1/4 Watt	10%	ERD-14VK122
R 21	Solid Resistor	47 Ω	1/2 Watt	20%	ERC-12BFM470
R 22	Carbon Resistor	820 Ω	1/4 Watt	10%	ERD-14VK821
R 23	Carbon Resistor	2.7 KΩ	1/4 Watt	10%	ERD-14VK272
	Carbon Resistor (appropriable)	2.2 KΩ	1/4 Watt	10%	ERD-14VK222

Ref. No.	Description	Part No.
	Carbon Resistor 3.3 KΩ 1/4 Watt 10% (appropriable)	ERD-14VK332
	Carbon Resistor 3.9 KΩ 1/4 Watt 10% (appropriable)	ERD-14VK392
R 24	Wire Wound Resistor 1.5 Ω 1/2 Watt 10%	ERW-12L1R5
R 25	Carbon Resistor 100 Ω 1/4 Watt 10%	ERD-14VK101
R 26	Solid Resistor 10 Ω 1/2 Watt 20%	ERC-12BFM100
R 27	Carbon Resistor 2.7 KΩ 1/4 Watt 10%	ERD-14VK272
R 28	Carbon Resistor 560 Ω 1/4 Watt 10%	ERD-14VK561
R 29	Carbon Resistor 100 Ω 1/4 Watt 10%	ERD-14VK101
R 30	Carbon Resistor 27 KΩ 1/4 Watt 5%	ERD-14VJ273
R 31	Carbon Resistor 560 Ω 1/4 Watt 10%	ERD-14VK561
R 32	Carbon Resistor 18 KΩ 1/4 Watt 10%	ERD-14VK183
R 33	Carbon Resistor 47 Ω 1/4 Watt 10%	ERD-14VK470
R 34	Carbon Resistor 4.7 Ω 1/4 Watt 10%	ERD-14VK4R7
R 35	Carbon Resistor 2.7 KΩ 1/4 Watt 10%	ERD-14VK272
R 36	Carbon Resistor 2.2 KΩ 1/4 Watt 10%	ERD-14VK222
R 37	Carbon Resistor 1 KΩ 1/4 Watt 10%	ERD-14VK102
	Carbon Resistor 1.8 KΩ 1/4 Watt 10% (appropriable)	ERD-14VK182
	Carbon Resistor 560 Ω 1/4 Watt 10% (appropriable)	ERD-14VK561
R 38	Carbon Resistor 100 Ω 1/4 Watt 10%	ERD-14VK101

VARIABLE RESISTORS

VR 1	Variable Resistor 20KΩ–C	EVH-BOA21C24
VR 2	Variable Resistor 5KΩ–C	EVH-BOAL21C53
VR 3	Variable Resistor 2KΩ–B	EVL-TOAA00B23
VR 4	Variable Resistor 500Ω–B	EVL-TOAA00B52
VR 6	Variable Resistor 2KΩ–B	EVL-TOAA00B23

CAPACITORS

C 1	Electrolytic Capacitor 3 μF WV 15 V	ECE-A15V3
C 2	Electrolytic Capacitor 30 μF WV 6 V	ECE-A6V30
C 3	Electrolytic Capacitor 5 μF WV 10 V	ECE-A10V5
C 4	Electrolytic Capacitor 3 μF WV 15 V	ECE-A15V3
C 5	Electrolytic Capacitor 1 μF WV 50 V	ECE-A50V1M
C 6	Mylar Capacitor 0.047 μF WV 50 V	ECQ-M05473MZ
C 7	Polystyrene Capacitor 680 PF WV 125 V	ECQ-S1681KZ
C 8	Electrolytic Capacitor 10 μF WV 6 V	ECE-A6V10
C 9	Electrolytic Capacitor 50 μF WV 10 V	ECE-A10V50
C 10	Electrolytic Capacitor 10 μF WV 6 V	ECE-A6V10
C 11	Electrolytic Capacitor 100 μF WV 3 V	ECE-A3V100
C 12	Electrolytic Capacitor 500 μF WV 10 V	ECE-A10V500
C 13	Polystyrene Capacitor 560 PF WV 125 V	ECQ-S1561KZ
C 14	Mylar Capacitor 0.0056 μF WV 50 V	ECQ-M05562MZ
C 15	Mylar Capacitor 0.0056 μF WV 50 V	ECQ-M05562MZ
C 16	Polystyrene Capacitor 3900 PF WV 125 V	ECQ-S1392KZ
C 17	Electrolytic Capacitor 150 μF WV 15 V	ECE-A15V150
C 18	Electrolytic Capacitor 150 μF WV 15 V	ECE-A15V150
C 19	Electrolytic Capacitor 4 μF WV 15 V	ECE-A15V4I
C 20	Mylar Capacitor 0.1 μF WV 50 V	ECQ-M05104MZ
C 21	Electrolytic Capacitor 200 μF WV 6 V	ECE-A6V200
C 22	Electrolytic Capacitor 50 μF WV 6 V	ECE-A6V50
C 23	Mylar Capacitor 0.001 μF WV 50 V	ECQ-M05102MZ
C 25	Electrolytic Capacitor 5 μF WV 10 V	ECE-A10V5
C 26	Electrolytic Capacitor 5 μF WV 10 V	ECE-B15V5
C 27	Electrolytic Capacitor 50 μF WV 3 V	ECE-A3V50
C 28	Electrolytic Capacitor 100 μF WV 15 V	ECE-A15V100
C 29	Electrolytic Capacitor 5 μF WV 15 V	ECE-B15V5

TRANSISTORS

Ref. No.	Description	Part No.
Tr 1	Transistor	2SB 173(A)
Tr 2	Transistor	2SB 175(B)
Tr 3	Transistor	2SB 175(B)
Tr 4	Transistor	2SB 324
Tr 5	Transistor	2SB 324
Tr 6	Transistor	2SB 172(A)
Tr 7	Transistor	2SB 175(A)
Tr 8	Transistor	2SB 175(A)
Tr 9	Transistor	2SB 176(R)

THERMISTORS

SM 1	Thermistor MT-81	QVM-800A
SM 2	Thermistor 5A-120	QVM-201A

DIODE

D	Diode OA-70	

TRANSFORMERS

T 1	Input Transformer	QLA-0108-2
T 2	Output Transformer	QLA-0325
T 3	Oscillator Transformer	QLB-0108
T 4	Choke Transformer	QLP-0105

SWITCHES

S 1	Slide Switch (Record/Play)	ESD-1610
S 2	Slide Switch (Head Connection)	ESD-1610
S 3	Slide Switch (Monitor Selector)	QSS-1002
S 4	Leaf Switch	—
	(Plunger Power/Stop Switch)	QSB-0136
S 5	Micro Switch (Power)	QSM-0009
S 6	Leaf Switch (Instant Stop)	QSB-0148
S 7	Leaf Switch (Remote Cut-off)	QSB-0146
S 8	Slide Switch (Auto/Manual)	ESS-1013
S 10	Leaf Switch (Bias Cut-off)	QSB-0149

MECHANICAL PARTS

Ref. No.		Description	Part No.
1	M750	Tape Guide Post Screw, Left	QAG-1068
2	M751	Plastic Insulation Pipe	QAG-1072
3	M752	Sensing Lug	QAG-1069
4	M753	Tape Guide Washer, Left	QAG-1070
5	M754	Tape Guide, Left	QAG-1071
6	M755	Fiber Washer, 4.1×1.5×0.5	QAG-1073
7	M756	Tape Guide Plate Assembly	—
8	M757	Fiber for Left Tape Guide	QAG-1074
9	M758	Fiber Washer, 4.2×9.0×1.0	QBK-7017
10	M759	Nut, Left Tape Guide	QAG-1075
15	M760	Washer for Head Mounting Screw	QWQ-1067
16	M761	Head Mounting Spring	QBC-1035
17	M762	Head Mounting Plate Assembly, Left	—
20	M763	Fiber Washer, 4.0×7.0×0.5	QBK-7067
21	M764	Pressure Pad Spring, Left	QAP-1096
22	M765	Pressure Pad Assembly, Left	—
23	M767	Tape Guide Post Screw, Right	QAG-1076
24	M768	Tape Guide Washer, Right	QAG-1005
25	M769	Tape Guide, Right	QAG-1008
26	M770	Tape Guide Plate, Right	QAG-1077
27	M771	Tape Guide Collar, Right	QAG-1078
28	M772	Head Mounting Plate Assembly, Right	—
29	M773	Pressure Pad Assembly, Right	—
30	M774	Pressure Pad Spring, Right	QAP-1097
32	M775	Duracon Washer, 4.1×5.5×0.5	QBJ-3027
33	M776	Pressure Roller	QDP-1097
36	M777	Pressure Pad Lever Assembly	—
37	M778	Pressure Roller Lever Assembly	—
39	M779	Prersure Roller Lever Shaft	QMS-1182
40	M780	Pressure Roller Lever Spring	QBN-1025
41	M781	Pressure Roller Lever Spring Hook	—
42	M782	Fiber Washer	—
43	M783	Washer	QTW-1019
45	M784	Volume Control Holder	—
46	M785	Baseplate Assembly Upper	—
47	M786	Tape Counter Belt	QDB-0051
48	M787	Tape Counter	QDC-0011
49	M788	Hexagonal Nut, 1.3t	—
50	M789	Flywheel Bearing, Upper	QMM-1087
51	M790	Capstan Bearing Holder	—
53	M791	Idler Wheel-A Spring	QBP-1072
54	M792	Upper Idler Wheel-A Assembly	QXI-0009
54-1	M793	Felt for Upper Idler Wheel-A	—
55	M794	Idler Wheel-A Washer	QWQ-1069
56	M795	Lower Idler Wheel-A Assembly	QXI-0010
58	M796	Idler Wheel-A Belt	QDB-0052
59	M797	Idler Wheel-A Shaft	QMS-1184
60	M798	Reel Table Screw	QHT-230×5C3
61	M799	Reel Table Assembly Left	QXP-0124-1
62	M800	Felt Assembly Left Reel Table	—
63	M802	Reel Table Shaft	QMS-1185
65	M803	Reel Table Assembly, Right	QXP-0125-1
44	M804	Pressure Pad See-saw Lever	—
66	M805	F.F. Roller Felt	QBF-1084
67	M806	F.F. Roller	QDP-1099
68	M807	F.F. Roller Lever Assembly	—
69	M808	F.F. Roller Lever Spring	QBT-1043
70	M809	F.F. Roller Lever Shaft	—
71	M810	Fiber Washer, 5.0×9.0×0.5	QBK-7042
72	M811	Brake Assembly, Left	—
73	M813	Brake Spring	QBT-1146
74	M814	Idler Wheel-B	QXI-0008
75	M815A	Idler Bracket-B Assembly	—
76	M816A	Idler Wheel-B Bracket	—
77	M817	Idler Bracket-A Assembly	—
78	M818	Motor Pulley	QDP-1098
79	M819	Flywheel Belt	QDB-0053
80	M820	Motor Bracket	—
85	M695	Pipe	QKT-1119
86	M694	Motor Mounting Rubber Cushion	QBC-1055
87	M821	Slide Switch Rod Assembly	—
88	M822	Brake Assembly, Right	—
89	M823	Brake Rod Assembly	—
90	M824	Brake Shaft	—
91	M825	Slide Switch Rod Bracket	—
92	M826	Capstan (3-3/4 ips.)	QMP-1079
93	M827	Flywheel	QXF-0026
94	M828	Steel Thrust Ball	QDK-1001
95	M829	Stay-B	—
96	M830	Stay-A	—
97	M831	F.F. Roller Rod	—
98	M832	F.F. Roller Rod Spring	QBT-1147
99	M833	Pressure Roller Lever-B Assembly	—

Ref. No.		Description	Part No.
100	M834	Rod Bracket–B	—
101	M835	Rod Bracket–A	—
102	M836	Play Lever Spring–A	QBT-1148
103	M837	Play Lever Spring–B	QBT-1149
104	M838	Play Rod–A	—
105	M839	Play Rod–B Assembly	—
106	M840	Play Lever Assembly	—
107	M841	Instant Stop Rod	—
108	M842	Instant Stop Spring	QBC-1045
109	M843	Lever Meter Holder	—
110	M844	Baseplate Assembly, Lower	—
111	M845	Push Button Spring	QBP-1071
112	M846	Push Button Assembly	QXB-0042
113	M847	Play Button Assembly	QXB-0043
114	M848	Push Button Holder Shaft–A	—
115	M849	Push Button Frame Shaft	—
116	M850	Push Button Lock Plate	—
117	M851	Brake Wire	QBI-1004
118	M852	Slide Switch Rod Spring	QBT-1150
122	M853	Idler Wheel–A Bearing Holder	—
123	M165	Hexagonal Nut, N8φ	QNN-8032B1
125	M854	Idler Wheel–A Shaft Bearing	QMM-1088
126	M855	Amplifier Mounting Angle	—
127	M856	Plunger Rod	—
128	M857	Split Pin	—
129	M858	Push Button Lock Spring	QBP-1073
131	M859	Record Lever–B	—
132	M860	Flywheel Bearing, Lower	—
133	M861	Push Button Frame Shaft, 2.5φ	—
134	M862	See–saw Metal	—
135	M863	Instant Stop Metal	—
136	M864	F.F. Rod Assembly	—
137	M865	Flywheel Thrust Steel Ball	—
138	M866	Pressure Pad See–saw Lever Metal	—
130	M867	Motor	QDM-0921
139	M868	Capstan Holding Nut	QHQ-1067
140	M880	Rubber Washer 5×9.0×0.6	QBG-1069
83	X160	Small Screw, —M2.6φ×4	QHM-126×4U3
13	X162	Small Screw, —M2φ×10	QHM-120×10U3
81	X166	Small Screw, —M2.6φ×8	QHM-126×8U3
57	X167	Small Screw, —M2.6φ×10	QHM-126×10U3
17	X171	Small Screw, —M3φ×5	QHM-130×5U3
52	X175	Small Screw, —M3φ×12	QHM-130×12U3
14	X190	Small Screw, —M2φ×6	QHM-120×6U3
18	X194	Small Screw, —M2.6φ×18	QHM-126×8U3
121	X334	Fiber Washer, 4.2×9.0×0.5	QBK-7033
35	X343	Fiber Washer, 7.0×12.0×0.25	QBK-7037
64	X343	Fiber Washer, 7.0×12.0×0.25	QBK-7037
82	X363	Spring Washer, SW2.6φ	QWS-262T3
11	X364	Spring Washer, SW3φ	QWS-302U3
119	X365	Spring Washer, SW4φ	QWS-402T3
124	X366	Spring Washer, SW8φ	QWS-802T3
84	X375	Flat Washer 2.6φ	QWP-2612N1
38	X384	E–type Washer, E4φ	QNS-404U3
34	X385	E–type Washer, E5φ	QNS-504U3
31	X387	E–type Washer, E3φ	QNS-404U3
12	X394	Hexagonal Nut, N3φ	QNN-3022U3
120	X395	Hexagonal Nut, N4φ	QNN-4022U3

ELECTRICAL PARTS

Ref. No.		Description	Part No.
151	E470	Normal Operation Head Assembly	WY-007X
152	E471	Reverse Operation Head Assembly	WY-007W
153	E472	Level Meter	QSL-0021
154	E473	11–P Multi–connector	QJS-0108
155	E474	Jack, M3–B	QJA-0104
156	E475	Jack Unit–B	QJA-0111
157	E476	Midget Power Relay (S9)	QSK-0102
158	E477	Plunger	QME-0105
159	E487	Speaker	EAS-15D50SF
160	E478	Printed Circuit Board–A	QEM-1003
161	E479	Printed Circuit Board–B	QEM-1004
162	E480	Printed Circuit Board–C	QEI-0074
163	E482	Heat Dissipating Angle	QTT-179
164	E483	Heat Dissipating Cap	QTH-1001
165	E484	Output Transformer Angle	QTT-1205
166	E485	Record Lever–A	QML-1152
167	E481	Record Lever Spring	QHT-1096
168	E486	Spacer–B (Head Height Adjustment)	QTW-1006
169	E444	Head Shielding Cover	QTS-1013–1

CABINET PARTS

Ref. No.		Description	Part No.
180	G440	Case Lid Assembly	QYA-0042
181	G441	Case Body Assembly	QYB-0087
181-1	G442	Case Side Plate, Right	QGK-1083
181-2	G443	Case Side Plate, Left	QGK-1084
181-3	G444	Handle	QKH-1022
181-4	G445	Small Screw, +MS3φ×6	QHV-230×6C1
181-5	G446	Front Panel Assembly	QYK-0010
181-6	G447	Tapping Screw, +BH3φ×8	QHB-530×8U3
181-7	G448	Washer	QWQ-1055
181-8	G449	Vibration Absorber	QBC-1063
181-9	G450	Capstan Rest	QMS-1129
182	G451	Case Bottom Assembly	—
182-1	G452	Pocket Lid Assembly	—
182-2	G453	Tapping Screw, +S3φ×10	QHS-530×100V3
183	G454	Head Cover Assembly	QYR-0047
184	G455	CUE Button	QGO-4021-1
185	G456	Battery Lid Assembly	QEO-0049
186	G457	Small Screw, +M4φ×20	QHM-240×20V3
187	G458	Screw	QHQ-1046
188	G459	Jack Mount	QCJ-1048
189	G460	Volume Control Knob Right	QYT-0041
191	G461	Volume Control Knob, Left	QYT-0043
190	X174	Screw, Round Head M3φ×10	QHM-230×10U3

ACCESSORIES

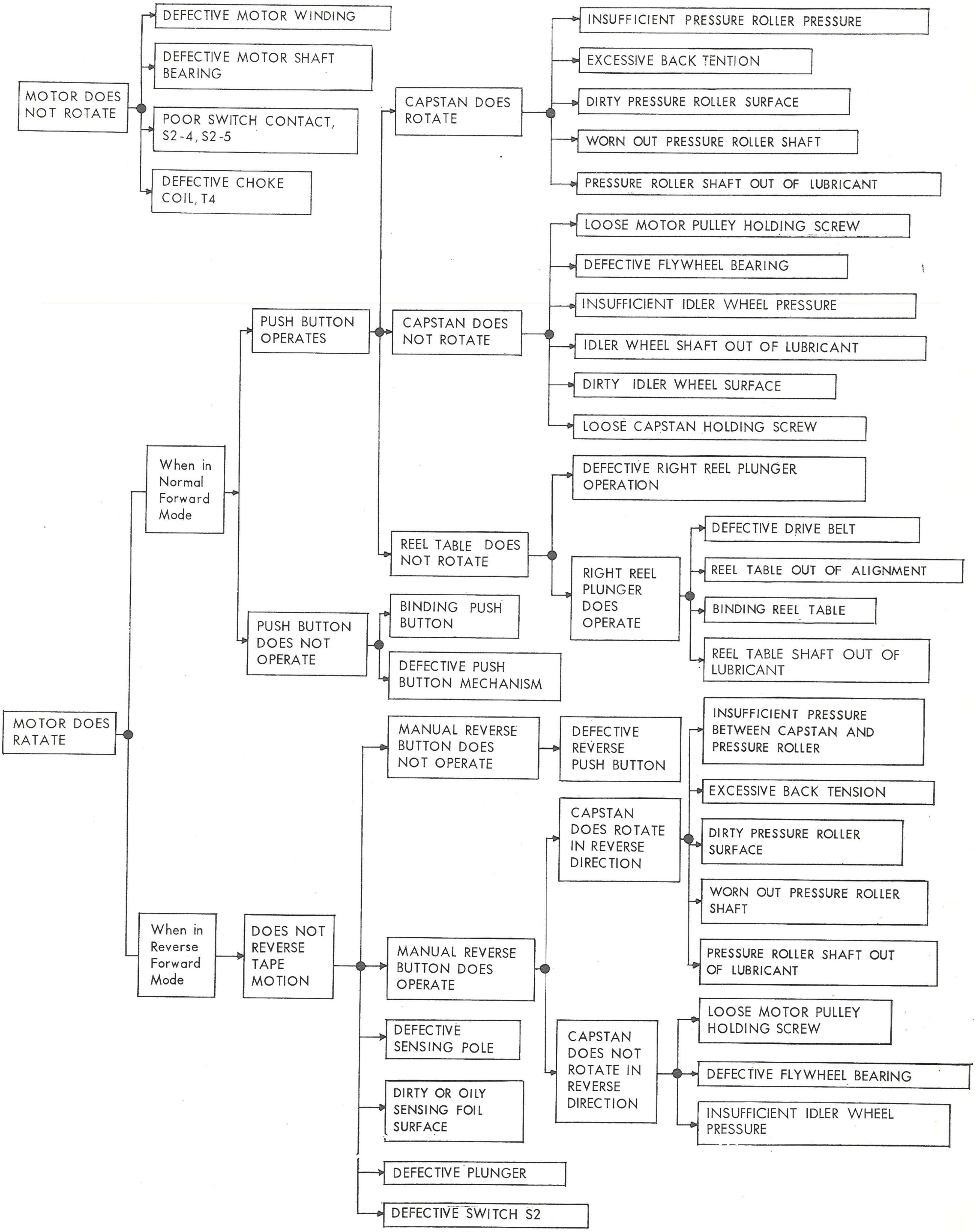
A	1	Dynamic Microphone (with Stand)	WM-2095N
A	1–1	Microphone Stand	WN-105N
A	2	5″ Recording Tape	QFT-5NR49Z
A	3	5″ Empty Reel	QFR-5NZ
A	4	2 Pin Plug B	QJP-0910
A	5	Magnetic Earphone	QAE-1QB1
A	6	Connection Cord–R	QEB-0017
A	7	Splicing Tape	QFS-0002–1
A	8	Sensing Tape	QFS-0004
A	9	Carrying Bag	QFK-0014
A	10	Instruction Book	QTT-0196

PACKING

P	1	Packing Case	QPN-1318
P	2	Inner Cushion (A)	QPN-1233
P	3	Inner Cushion (B)	QPN-1234
P	4	Inner Cushion (E)	QPN-1238
P	5	Accessory Case	QPW-1051
P	6	Paper Cushion (A)	QPW-1052
P	7	Paper Cushion (B)	QPW-1053
P	8	Gauze	QPO-1010

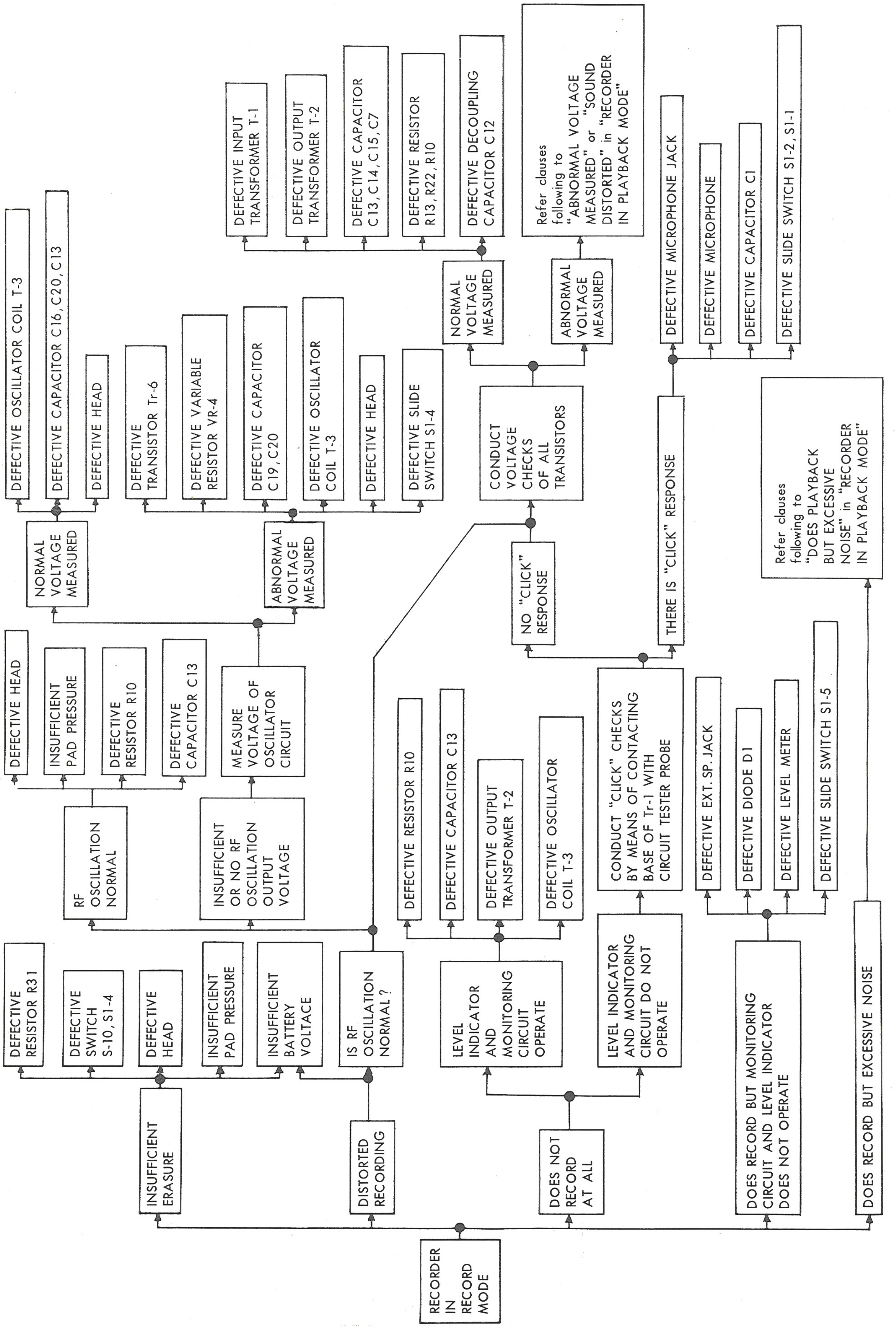
TROUBLE SHOOTING GUIDE 1

MALFUNCTIONS IN RECORD/PLAYBACK MOTION


MOTOR DOES NOT ROTATE
DEFECTIVE MOTOR WINDING
DEFECTIVE MOTOR SHAFT BEARING
POOR SWITCH CONTACT, S2-4, S2-5
DEFECTIVE CHOKE COIL, T4
CAPSTAN DOES ROTATE
INSUFFICIENT PRESSURE ROLLER PRESSURE
EXCESSIVE BACK TENTION
DIRTY PRESSURE ROLLER SURFACE
WORN OUT PRESSURE ROLLER SHAFT
PRESSURE ROLLER SHAFT OUT OF LUBRICANT
LOOSE MOTOR PULLEY HOLDING SCREW
DEFECTIVE FLYWHEEL BEARING
INSUFFICIENT IDLER WHEEL PRESSURE
IDLER WHEEL SHAFT OUT OF LUBRICANT
DIRTY IDLER WHEEL SURFACE
LOOSE CAPSTAN HOLDING SCREW
PUSH BUTTON OPERATES
CAPSTAN DOES NOT ROTATE
When in Normal Forward Mode
DEFECTIVE RIGHT REEL PLUNGER OPERATION
DEFECTIVE DRIVE BELT
REEL TABLE DOES NOT ROTATE
REEL TABLE OUT OF ALIGNMENT
RIGHT REEL PLUNGER DOES OPERATE
BINDING REEL TABLE
REEL TABLE SHAFT OUT OF LUBRICANT
BINDING PUSH BUTTON
PUSH BUTTON DOES NOT OPERATE
DEFECTIVE PUSH BUTTON MECHANISM
MOTOR DOES RATATE
MANUAL REVERSE BUTTON DOES NOT OPERATE
DEFECTIVE REVERSE PUSH BUTTON
INSUFFICIENT PRESSURE BETWEEN CAPSTAN AND PRESSURE ROLLER
EXCESSIVE BACK TENSION
CAPSTAN DOES ROTATE IN REVERSE DIRECTION
DIRTY PRESSURE ROLLER SURFACE
WORN OUT PRESSURE ROLLER SHAFT
When in Reverse Forward Mode
DOES NOT REVERSE TAPE MOTION
MANUAL REVERSE BUTTON DOES OPERATE
PRESSURE ROLLER SHAFT OUT OF LUBRICANT
LOOSE MOTOR PULLEY HOLDING SCREW
DEFECTIVE SENSING POLE
CAPSTAN DOES NOT ROTATE IN REVERSE DIRECTION
DEFECTIVE FLYWHEEL BEARING
DIRTY OR OILY SENSING FOIL SURFACE
INSUFFICIENT IDLER WHEEL PRESSURE
DEFECTIVE PLUNGER
DEFECTIVE SWITCH S2

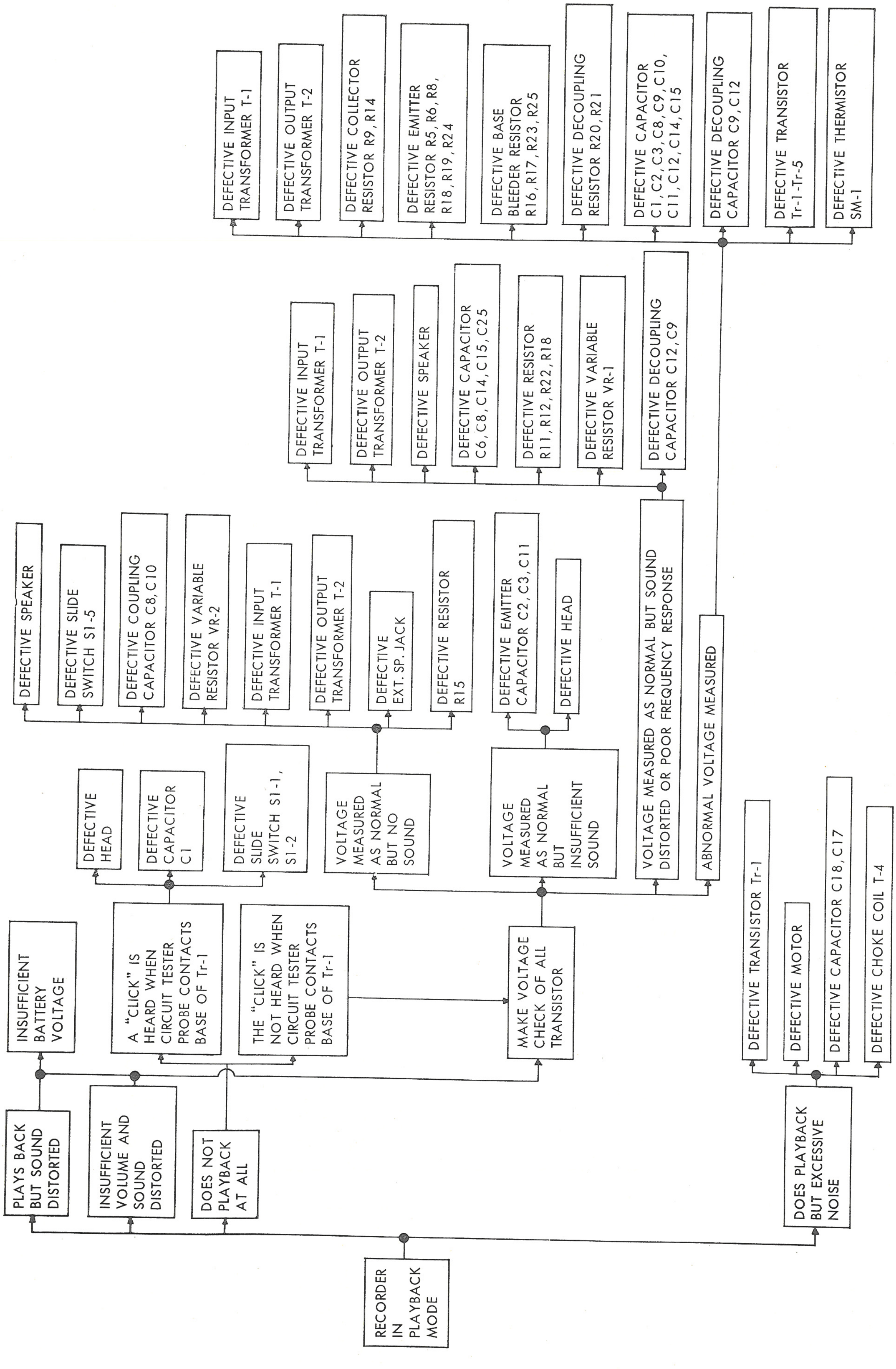
TROUBLE SHOOTING GUIDE 2

DEFECTIVE RECORDING CIRCUIT


RECORDER IN RECORD MODE
INSUFFICIENT ERASURE
DEFECTIVE RESISTOR R31
DEFECTIVE SWITCH S-10, S1-4
DEFECTIVE HEAD
INSUFFICIENT PAD PRESSURE
INSUFFICIENT BATTERY VOLTACE
DISTORTED RECORDING
IS RF OSCILLATION NORMAL ?
RF OSCILLATION NORMAL
DEFECTIVE HEAD
INSUFFICIENT PAD PRESSURE
DEFECTIVE RESISTOR R10
DEFECTIVE CAPACITOR C13
INSUFFICIENT OR NO RF OSCILLATION OUTPUT VOLTAGE
MEASURE VOLTAGE OF OSCILLATOR CIRCUIT
NORMAL VOLTAGE MEASURED
DEFECTIVE OSCILLATOR COIL T-3
DEFECTIVE CAPACITOR C16, C20, C13
DEFECTIVE HEAD
ABNORMAL VOLTAGE MEASURED
DEFECTIVE TRANSISTOR Tr-6
DEFECTIVE VARIABLE RESISTOR VR-4
DEFECTIVE CAPACITOR C19, C20
DEFECTIVE OSCILLATOR COIL T-3
DEFECTIVE HEAD
DEFECTIVE SLIDE SWITCH S1-4
DOES NOT RECORD AT ALL
LEVEL INDICATOR AND MONITORING CIRCUIT OPERATE
DEFECTIVE RESISTOR R10
DEFECTIVE CAPACITOR C13
DEFECTIVE OUTPUT TRANSFORMER T-2
DEFECTIVE OSCILLATOR COIL T-3
LEVEL INDICATOR AND MONITORING CIRCUIT DO NOT OPERATE
CONDUCT "CLICK" CHECKS BY MEANS OF CONTACTING BASE OF Tr-1 WITH CIRCUIT TESTER PROBE
NO "CLICK" RESPONSE
CONDUCT VOLTAGE CHECKS OF ALL TRANSISTORS
NORMAL VOLTAGE MEASURED
DEFECTIVE INPUT TRANSFORMER T-1
DEFECTIVE OUTPUT TRANSFORMER T-2
DEFECTIVE CAPACITOR C13, C14, C15, C7
DEFECTIVE RESISTOR R13, R22, R10
DEFECTIVE DECOUPLING CAPACITOR C12
ABNORMAL VOLTAGE MEASURED
Refer clauses following to "ABNORMAL VOLTAGE MEASURED" or "SOUND DISTORTED" in "RECORDER IN PLAYBACK MODE"
THERE IS "CLICK" RESPONSE
DEFECTIVE MICROPHONE JACK
DEFECTIVE MICROPHONE
DEFECTIVE CAPACITOR C1
DEFECTIVE SLIDE SWITCH S1-2, S1-1
DOES RECORD BUT MONITORING CIRCUIT AND LEVEL INDICATOR DOES NOT OPERATE
DEFECTIVE EXT. SP. JACK
DEFECTIVE DIODE D1
DEFECTIVE LEVEL METER
DEFECTIVE SLIDE SWITCH S1-5
DOES RECORD BUT EXCESSIVE NOISE
Refer clauses following to "DOES PLAYBACK BUT EXCESSIVE NOISE" in "RECORDER IN PLAYBACK MODE"

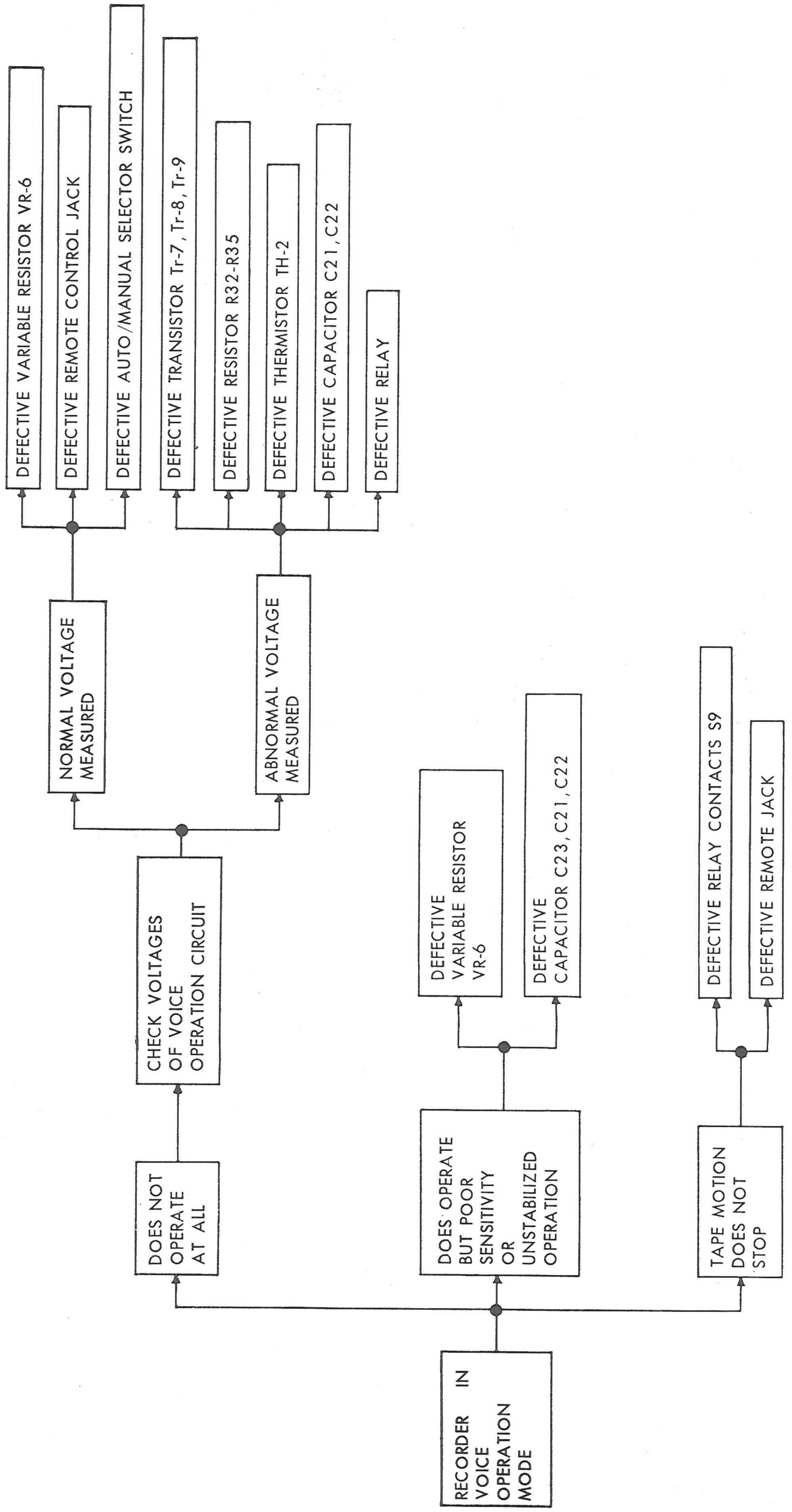
TROUBLE SHOOTING GUIDE 3

DEFECTIVE PLAYBACK CIRCUIT

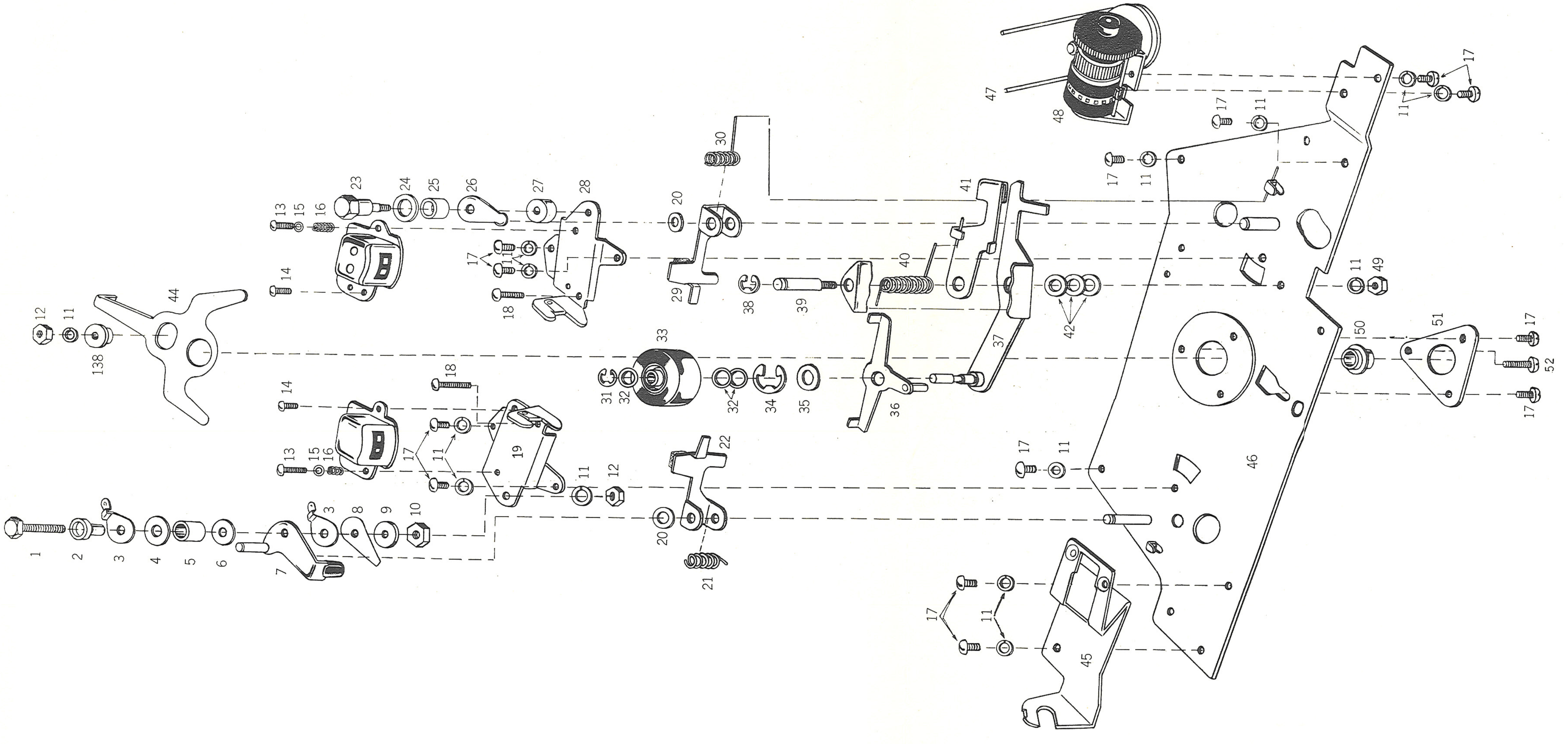

RECORDER IN PLAYBACK MODE
PLAYS BACK BUT SOUND DISTORTED
INSUFFICIENT VOLUME AND SOUND DISTORTED
DOES NOT PLAYBACK AT ALL
DOES PLAYBACK BUT EXCESSIVE NOISE
INSUFFICIENT BATTERY VOLTAGE
A "CLICK" IS HEARD WHEN CIRCUIT TESTER PROBE CONTACTS BASE OF Tr-1
THE "CLICK" IS NOT HEARD WHEN CIRCUIT TESTER PROBE CONTACTS BASE OF Tr-1
MAKE VOLTAGE CHECK OF ALL TRANSISTOR
DEFECTIVE HEAD
DEFECTIVE CAPACITOR C1
DEFECTIVE SLIDE SWITCH S1-1, S1-2
VOLTAGE MEASURED AS NORMAL BUT NO SOUND
VOLTAGE MEASURED AS NORMAL BUT INSUFFICIENT SOUND
VOLTAGE MEASURED AS NORMAL BUT SOUND DISTORTED OR POOR FREQUENCY RESPONSE
ABNORMAL VOLTAGE MEASURED
DEFECTIVE SPEAKER
DEFECTIVE SLIDE SWITCH S1-5
DEFECTIVE COUPLING CAPACITOR C8, C10
DEFECTIVE VARIABLE RESISTOR VR-2
DEFECTIVE INPUT TRANSFORMER T-1
DEFECTIVE OUTPUT TRANSFORMER T-2
DEFECTIVE EXT. SP. JACK
DEFECTIVE RESISTOR R15
DEFECTIVE EMITTER CAPACITOR C2, C3, C11
DEFECTIVE HEAD
DEFECTIVE INPUT TRANSFORMER T-1
DEFECTIVE OUTPUT TRANSFORMER T-2
DEFECTIVE SPEAKER
DEFECTIVE CAPACITOR C6, C8, C14, C15, C25
DEFECTIVE RESISTOR R11, R12, R22, R18
DEFECTIVE VARIABLE RESISTOR VR-1
DEFECTIVE DECOUPLING CAPACITOR C12, C9
DEFECTIVE INPUT TRANSFORMER T-1
DEFECTIVE OUTPUT TRANSFORMER T-2
DEFECTIVE COLLECTOR RESISTOR R9, R14
DEFECTIVE EMITTER RESISTOR R5, R6, R8, R18, R19, R24
DEFECTIVE BASE BLEEDER RESISTOR R16, R17, R23, R25
DEFECTIVE DECOUPLING RESISTOR R20, R21
DEFECTIVE CAPACITOR C1, C2, C3, C8, C9, C10, C11, C12, C14, C15
DEFECTIVE DECOUPLING CAPACITOR C9, C12
DEFECTIVE TRANSISTOR Tr-1-Tr-5
DEFECTIVE THERMISTOR SM-1
DEFECTIVE TRANSISTOR Tr-1
DEFECTIVE MOTOR
DEFECTIVE CAPACITOR C18, C17
DEFECTIVE CHOKE COIL T-4

TROUBLE SHOOTING GUIDE 4

DEFECTIVE VOICE OPERATION CIRCUIT


RECORDER IN VOICE OPERATION MODE
DOES NOT OPERATE AT ALL
CHECK VOLTAGES OF VOICE OPERATION CIRCUIT
NORMAL VOLTAGE MEASURED
DEFECTIVE VARIABLE RESISTOR VR-6
DEFECTIVE REMOTE CONTROL JACK
DEFECTIVE AUTO/MANUAL SELECTOR SWITCH
ABNORMAL VOLTAGE MEASURED
DEFECTIVE TRANSISTOR Tr-7, Tr-8, Tr-9
DEFECTIVE RESISTOR R32-R35
DEFECTIVE THERMISTOR TH-2
DEFECTIVE CAPACITOR C21, C22
DEFECTIVE RELAY
DOES OPERATE BUT POOR SENSITIVITY OR UNSTABILIZED OPERATION
DEFECTIVE VARIABLE RESISTOR VR-6
DEFECTIVE CAPACITOR C23, C21, C22
TAPE MOTION DOES NOT STOP
DEFECTIVE RELAY CONTACTS S9
DEFECTIVE REMOTE JACK

EXPLODED VIEWS


1
2
3
4
5
6
7
3
8
9
10
11
12
138
44
12
11
13
15
16
14
23
24
25
26
27
28
17
11
18
19
14
13
15
16
17
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19
18
11
12
20
29
30
20
21
22
31
32
33
32
34
35
36
38
39
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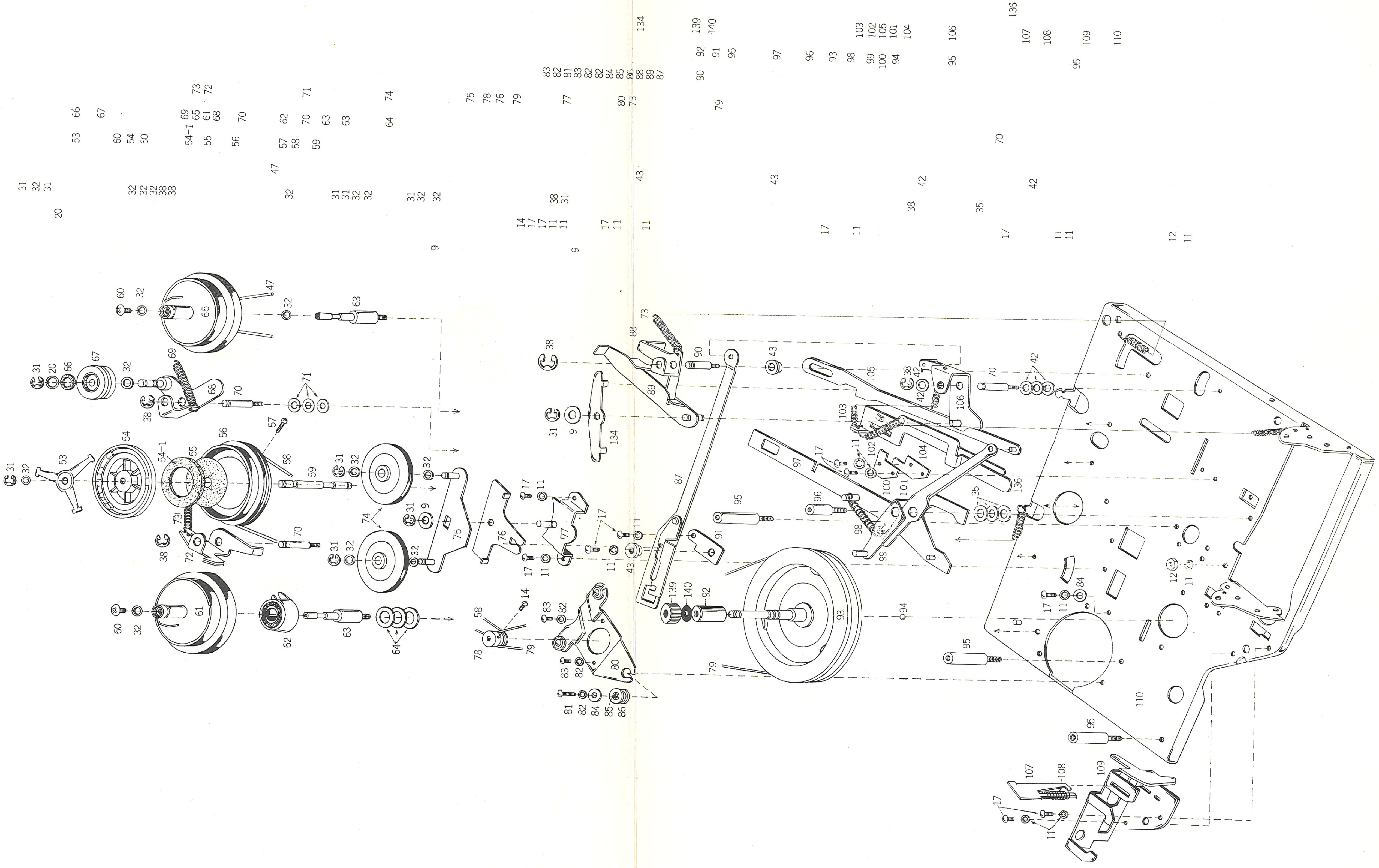
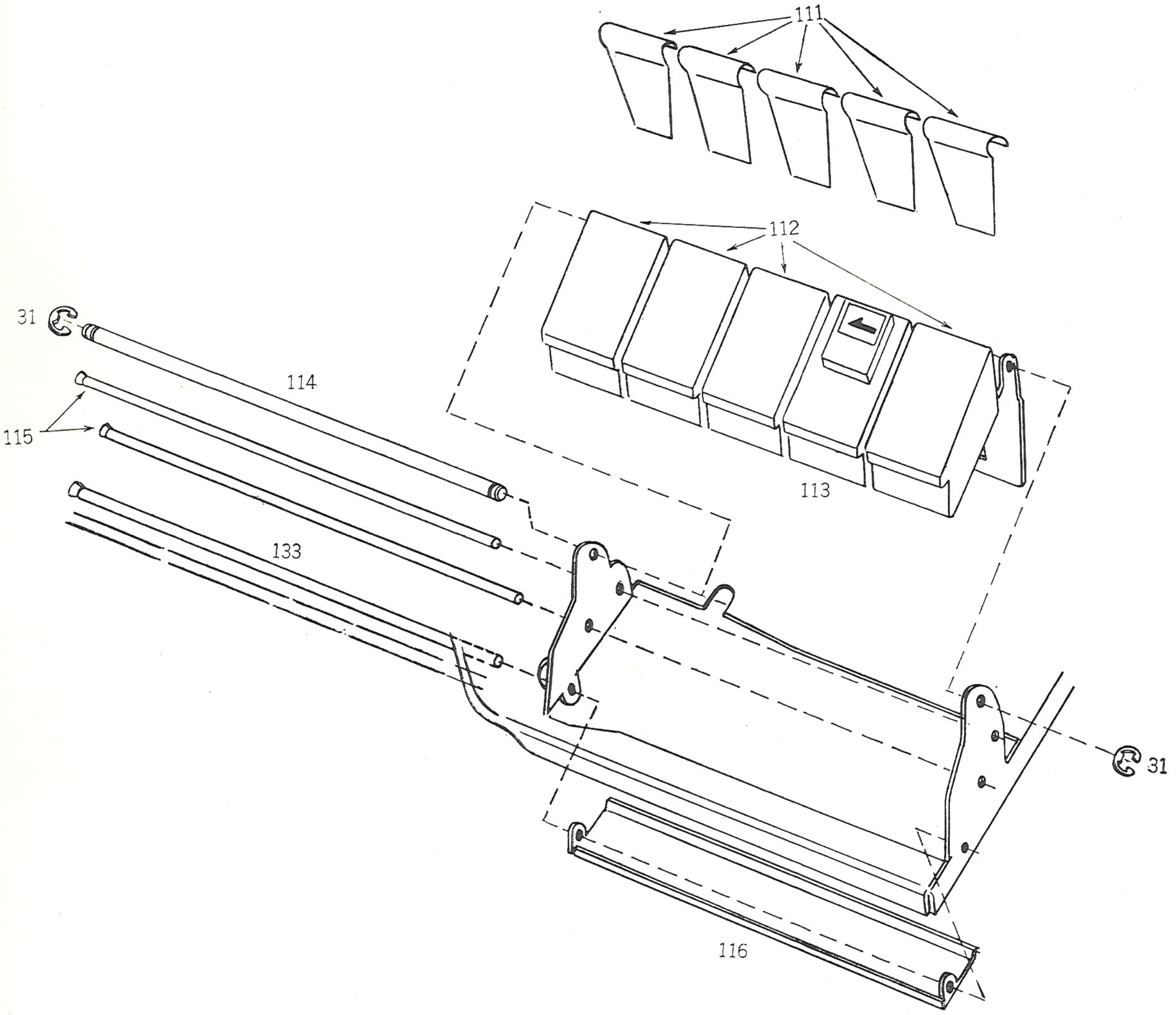
17
52
17
46
17
11
45


54-1


111
112
31
114
115
113
133
31
116

111

112

31

114

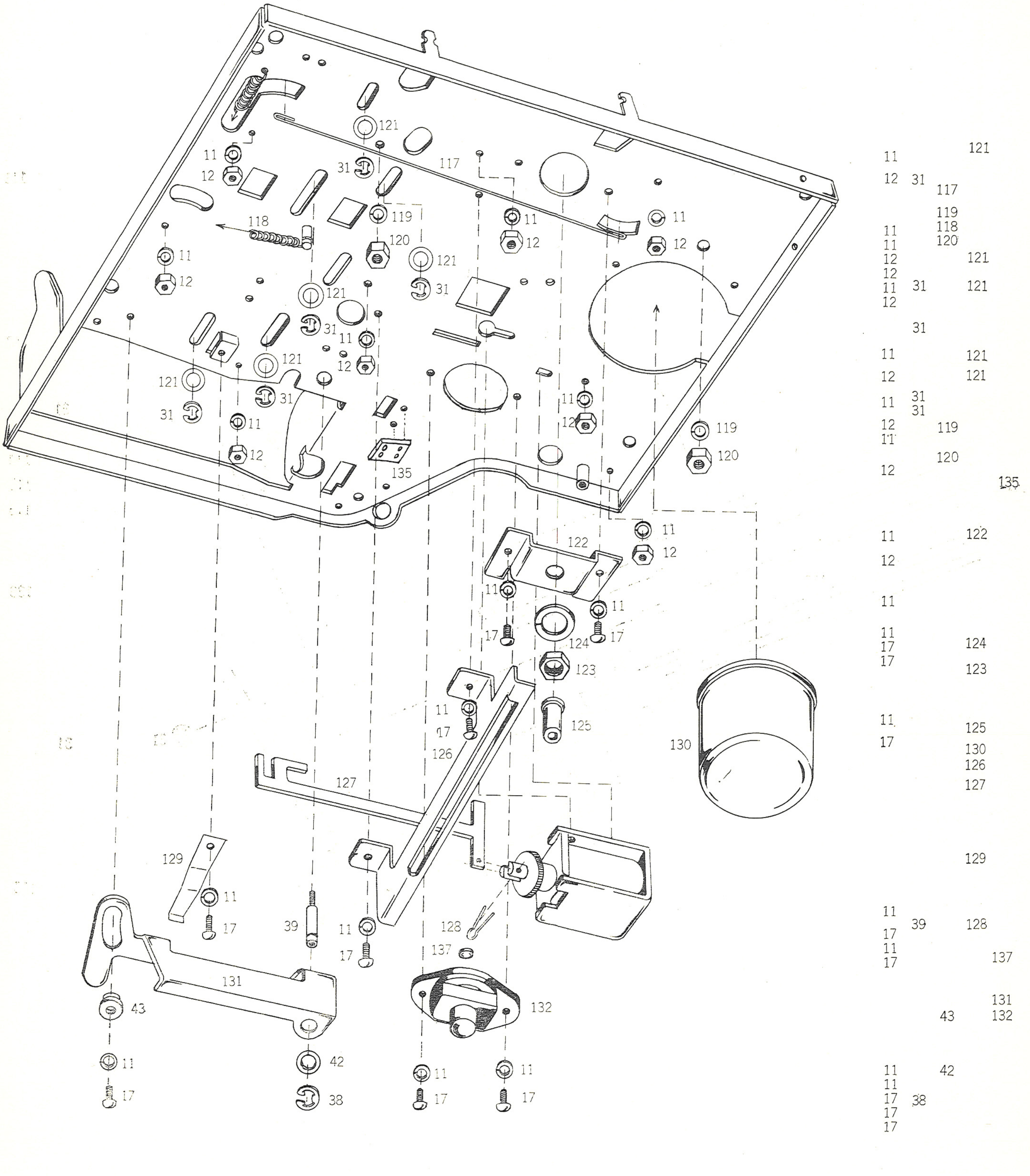
115

113

133

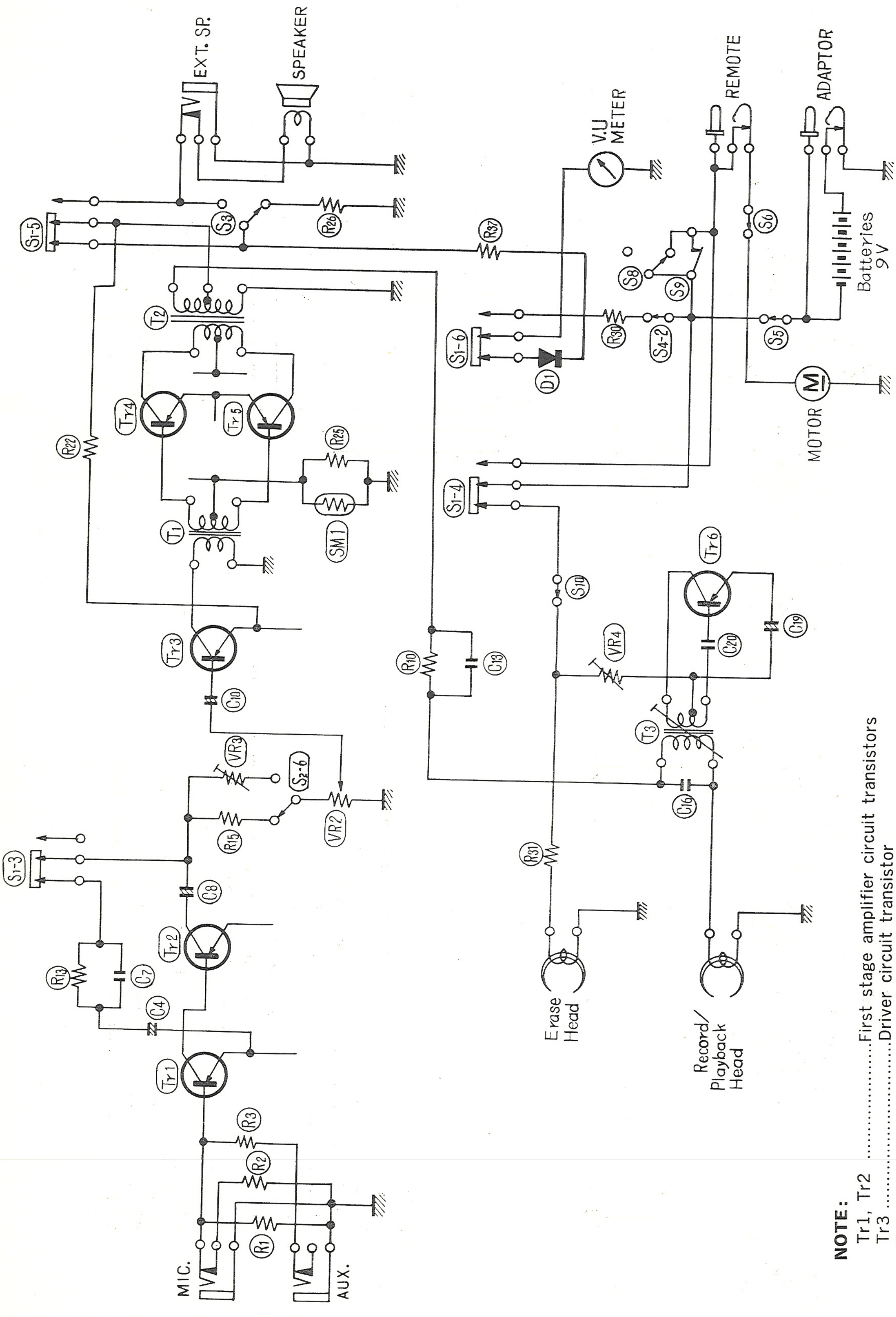
31

116



EXPLANATIONS ON CIRCUITS

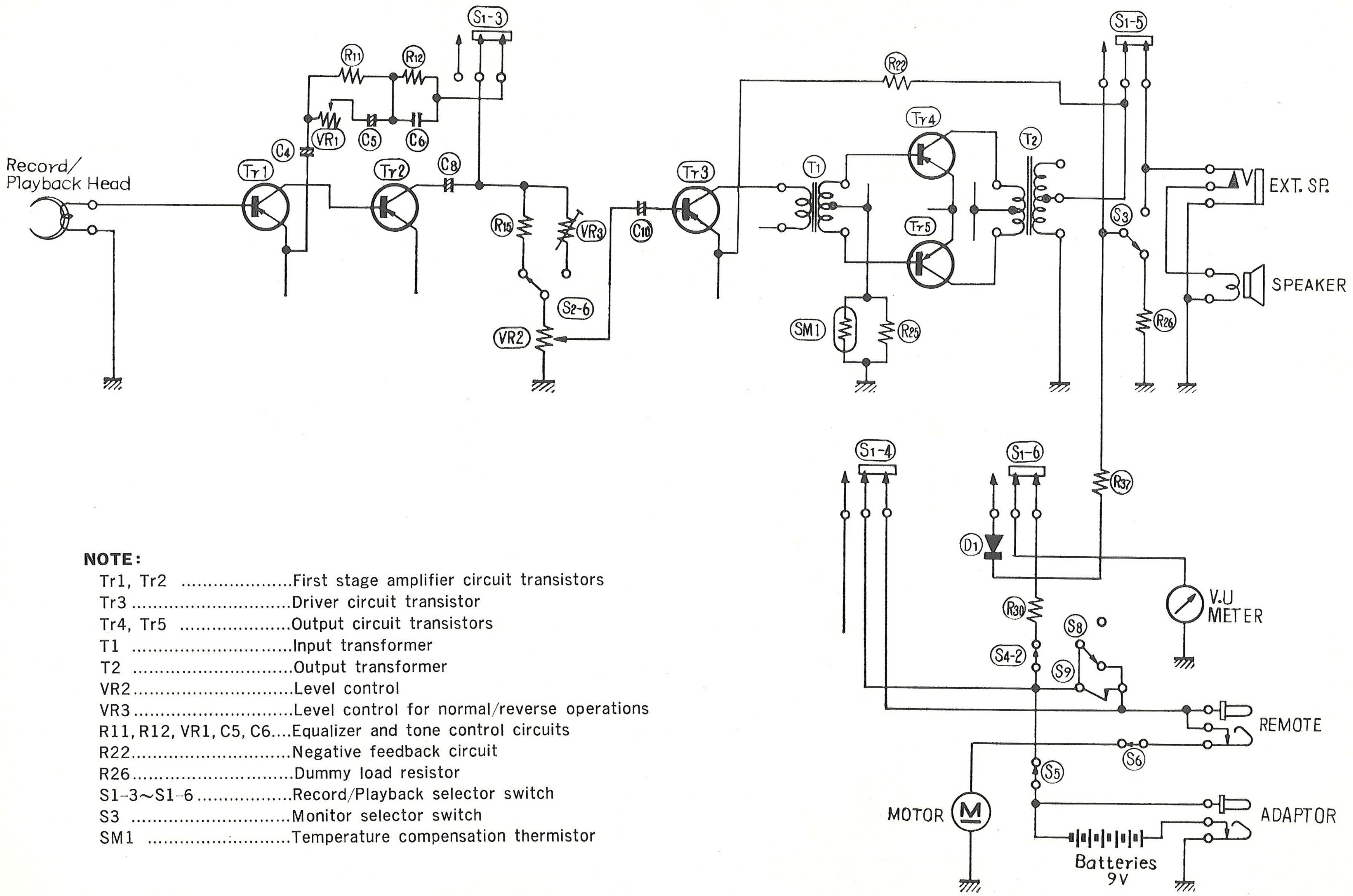
1. RECORDING AMPLIFIER CIRCUIT


MIC.
AUX.
R1
R2
R3
Tr1
C4
R13
C7
Tr2
C8
S1-3
R15
VR3
S2-6
VR2
C10
Tr3
R22
T1
SM1
R25
Tr4
Tr5
T2
S1-5
S3
R26
EXT. SP.
SPEAKER
R37
R10
C13
Erase Head
Record/ Playback Head
R31
S10
VR4
T3
C16
C20
C19
Tr6
S1-4
S1-6
D1
R30
S4-2
S8
S9
V.U. METER
REMOTE
S6
S5
ADAPTOR
Batteries 9V
MOTOR
M

NOTE:

Tr1, Tr2	First stage amplifier circuit transistors
Tr3	Driver circuit transistor
Tr4, Tr5	Output circuit transistors
Tr6	Oscillator circuit transistor
T1	Input transformer
T2	Output transformer
T3	Oscillator transformer
VR2	Level control
VR3	Level control for normal/reverse operations
VR4	Bias current control
R10, C13	Recording equalization circuit
R13, C7	Equalization circuit
R22	Negative feedback circuit
R26	Dummy load resistor
S1-3~S1-6	Record/Playback selector switch
S3	Monitor selector switch
D1	Rectifier diode
SM1	Temperature compensation thermistor

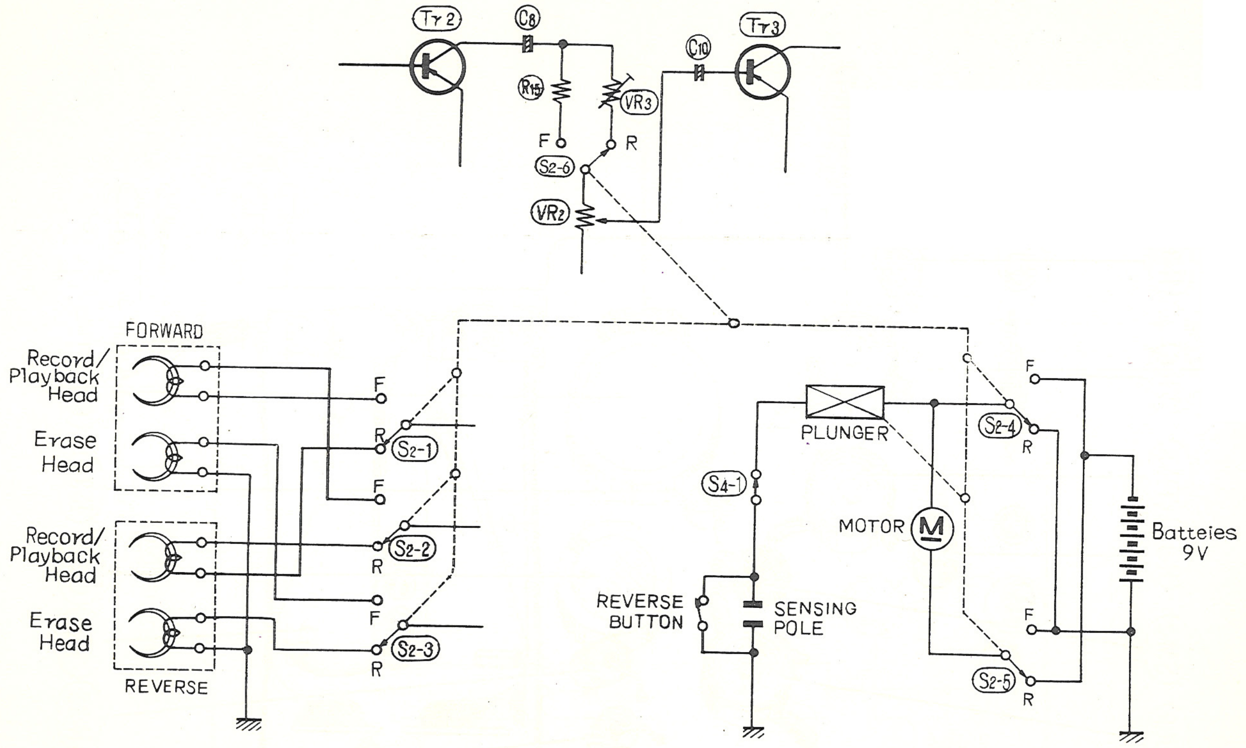
2. PLAYBACK AMPLIFIER CIRCUIT


Record/
Playback Head
Tr1
C4
VR1
R11
R12
C5
C6
Tr2
C8
S1-3
R15
VR3
S2-6
VR2
C10
Tr3
T1
SM1
R25
Tr4
Tr5
T2
R22
S1-5
S3
R26
EXT. SP.
SPEAKER
S1-4
S1-6
D1
R37
V.U
METER
R30
S8
S4-2
S9
REMOTE
S6
S5
MOTOR
M
ADAPTOR
Batteries
9V

NOTE:

Tr1, Tr2	First stage amplifier circuit transistors
Tr3	Driver circuit transistor
Tr4, Tr5	Output circuit transistors
T1	Input transformer
T2	Output transformer
VR2	Level control
VR3	Level control for normal/reverse operations
R11, R12, VR1, C5, C6	Equalizer and tone control circuits
R22	Negative feedback circuit
R26	Dummy load resistor
S1-3~S1-6	Record/Playback selector switch
S3	Monitor selector switch
SM1	Temperature compensation thermistor

3. REVERSE CIRCUIT

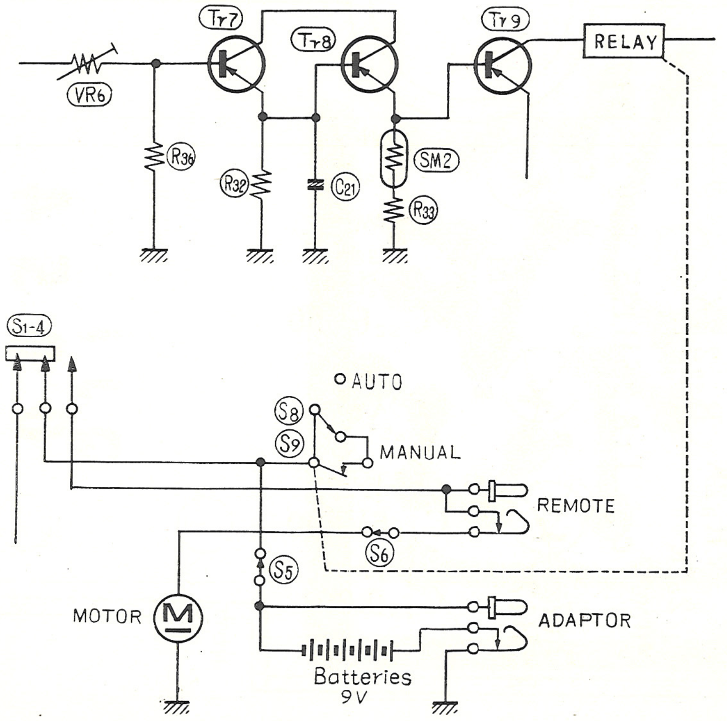

Tr2
C8
Tr3
C10
R15
VR3
F
R
S2-6
VR2
FORWARD
Record/ Playback Head
Erase Head
Record/ Playback Head
Erase Head
REVERSE
F
R
S2-1
F
S2-2
R
F
S2-3
R
PLUNGER
F
S2-4
R
S4-1
MOTOR
M
Batteies 9V
REVERSE BUTTON
SENSING POLE
F
S2-5
R

NOTE:

S2-1∼S2-6	Head selector switch (shown in normal reverse position)
S4-1	Plunger power switch

1. S4-1 turns "ON" when the recorder is set for PLAY or RECORD mode only, therefore the "Reverse Button" and the "Sensing Pole" are operative only when the recorder is set for "PLAY" or "RECORD" mode.
2. If the "Reverse Button" is "ON" or the "Sensing Pole" is short circuited by means of a sensing tape attached on the tape, the plunger is activated thus sets the slide switch (S2) to "Reverse" position causing the tape to move in reverse direction.

4. VOICE OPERATION CIRCUIT

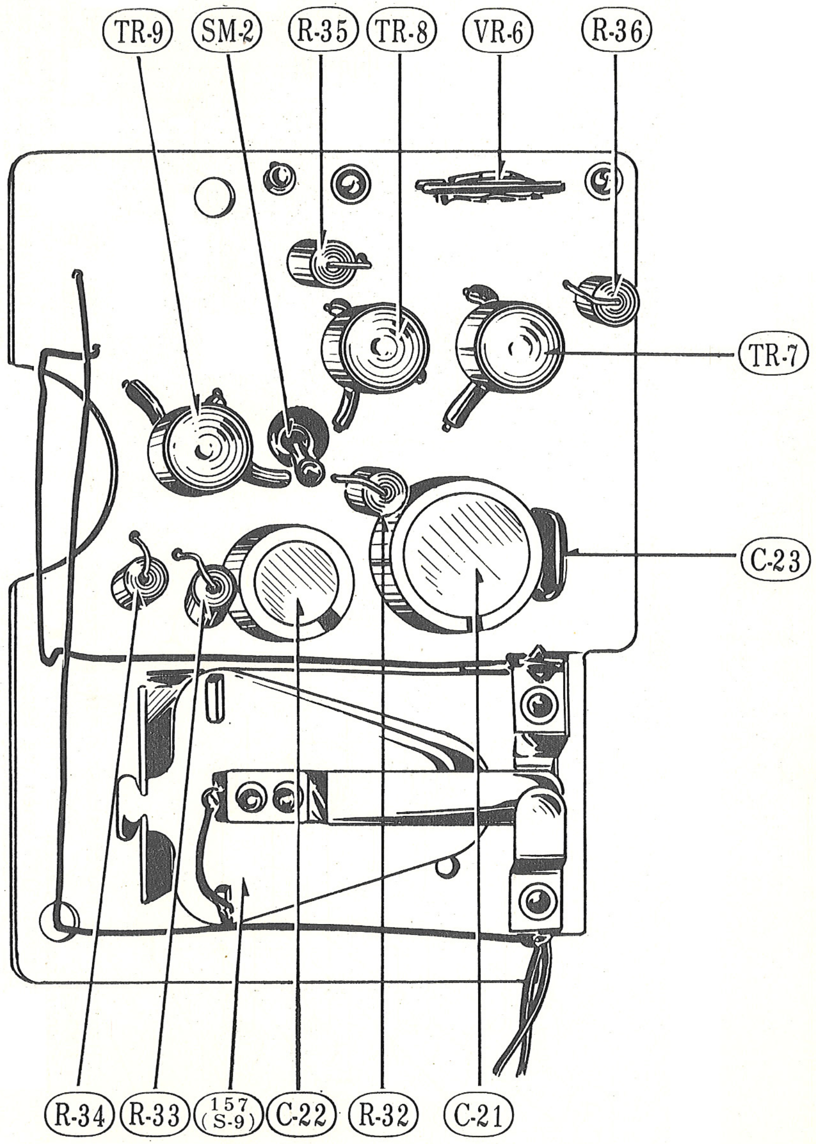

Tr7
Tr8
Tr9
RELAY
VR6
R36
R32
C21
SM2
R33
S1-4
AUTO
S8
S9
MANUAL
REMOTE
S6
S5
MOTOR
M
ADAPTOR
Batteries 9V

NOTE:

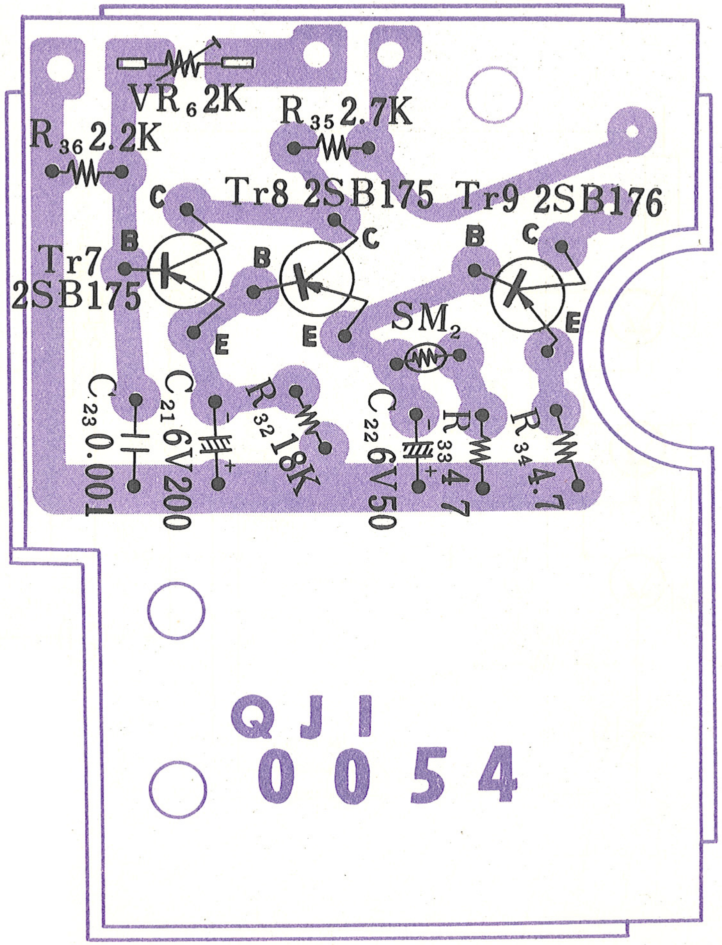
Tr7, Tr8, Tr9	3-stage DC amplifier transistors
VR6	Voice operation sensitivity control
R32, C21	Delay circuit
S8	AUTO/MANUAL Selector Switch
S9	Relay contacts
SM2	Temperature compensation thermistor

CIRCUIT BOARD

ELECTRICAL PARTS LOCATION

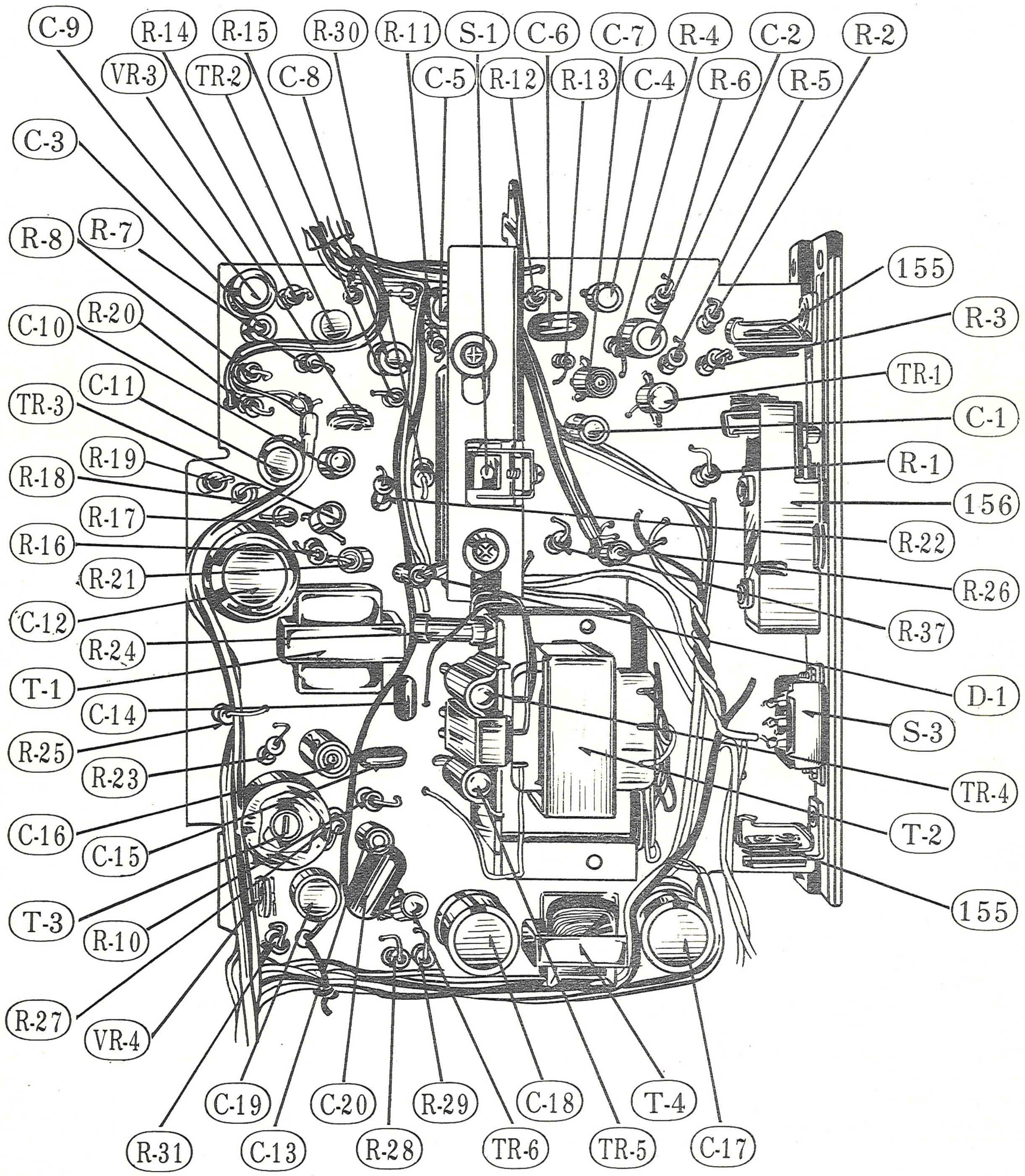

TR-9
SM-2
R-35
TR-8
VR-6
R-36
TR-7
C-23
R-34
R-33
157 (S-9)
C-22
R-32
C-21

CONDUCTOR VIEW

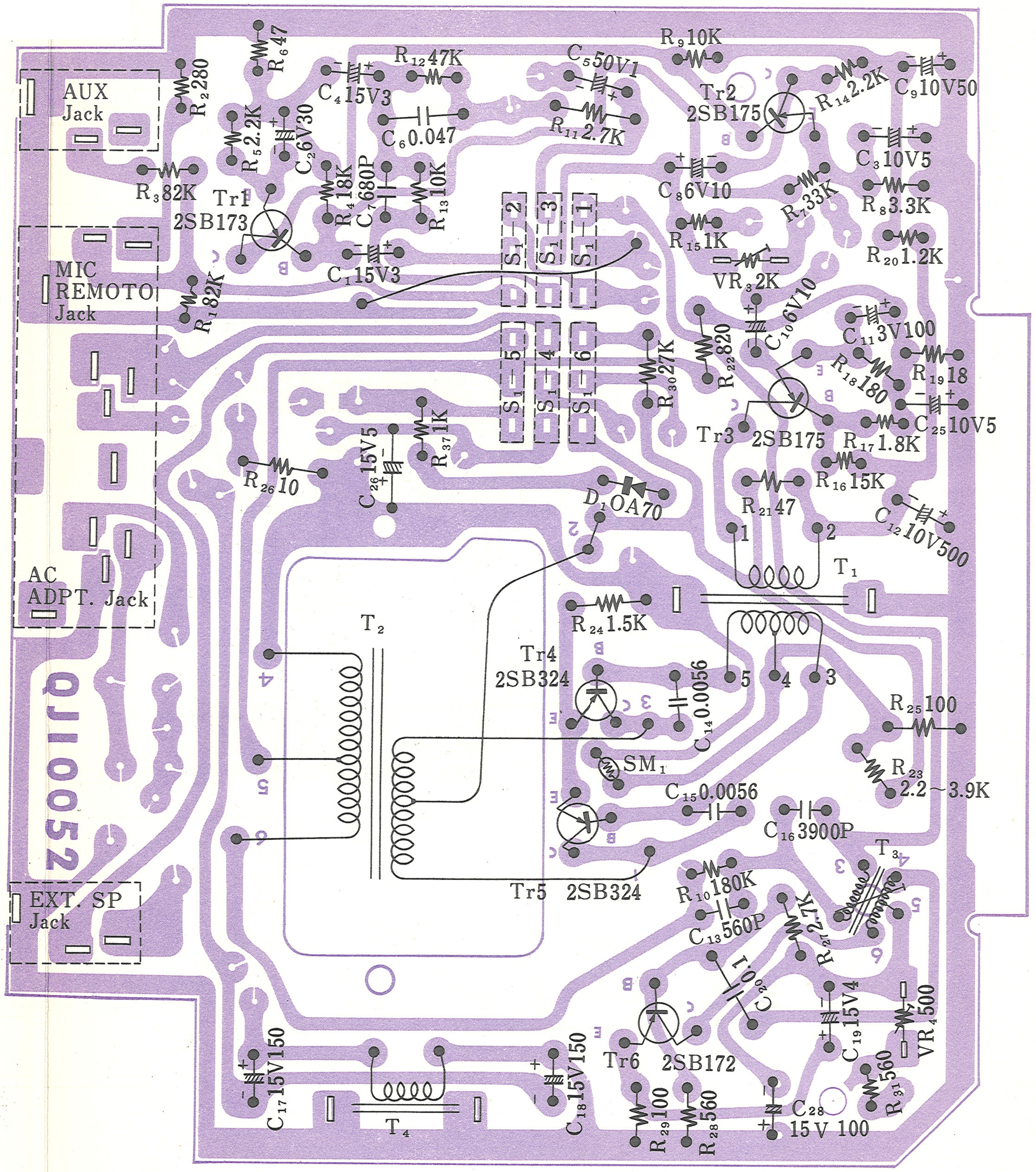

VR₆ 2K
R₃₅ 2.7K
R₃₆ 2.2K
Tr8 2SB175
Tr9 2SB176
Tr7 2SB175
B
C
E
SM₂
C₂₃ 0.001
C₂₁ 6V200
R₃₂ 18K
C₂₂ 6V50
R₃₃ 47
R₃₄ 4.7
QJI
0054

CIRCUIT BOARD

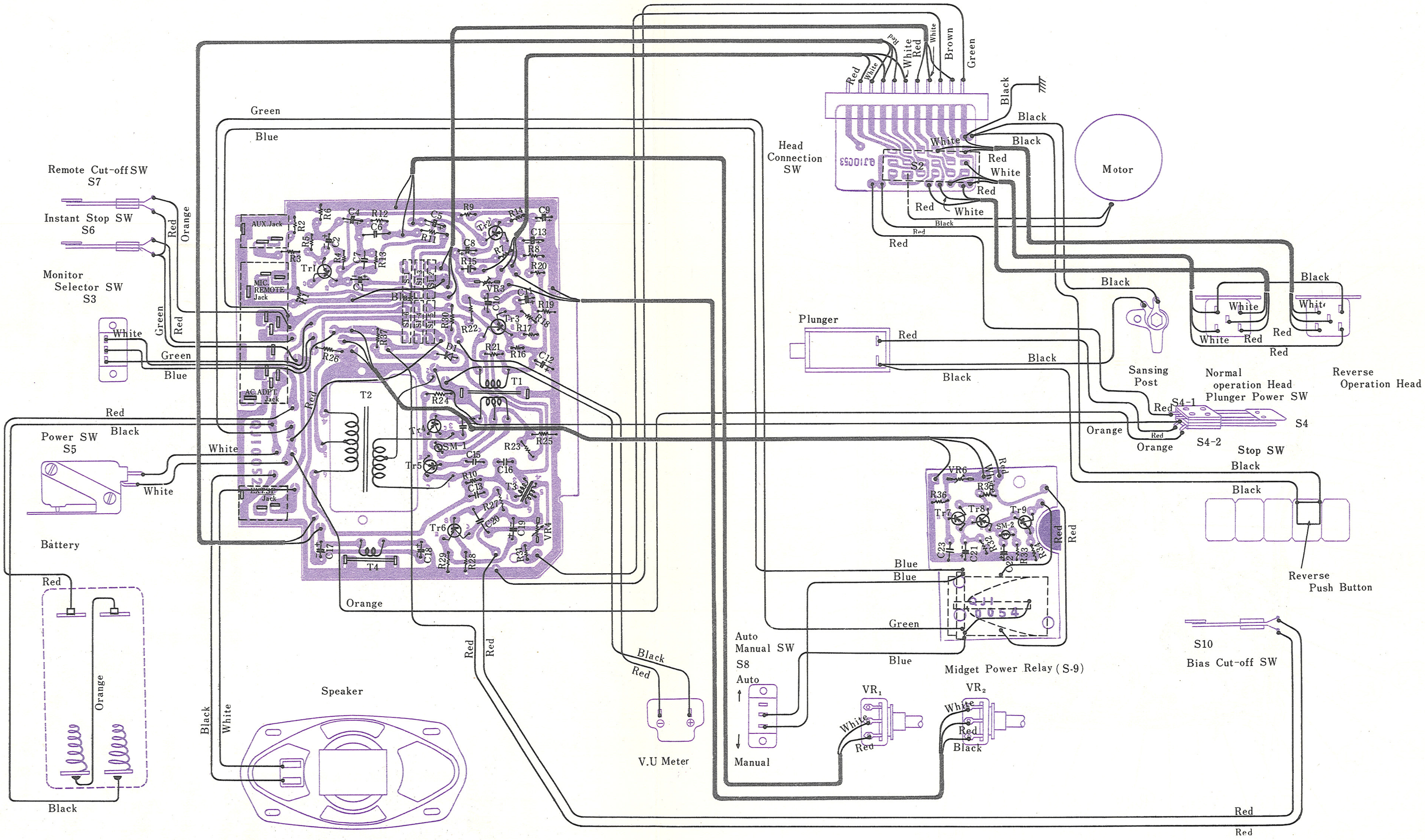
ELECTRICAL PARTS LOCATION


C-9
R-14
R-15
R-30
R-11
S-1
C-6
C-7
R-4
C-2
R-2
VR-3
TR-2
C-8
C-5
R-12
R-13
C-4
R-6
R-5
C-3
R-8
R-7
C-10
R-20
TR-3
C-11
R-19
R-18
R-17
R-16
R-21
C-12
R-24
T-1
C-14
R-25
R-23
C-16
C-15
T-3
R-10
R-27
VR-4
C-19
C-20
R-29
C-18
T-4
R-31
C-13
R-28
TR-6
TR-5
C-17
155
R-3
TR-1
C-1
R-1
156
R-22
R-26
R-37
D-1
S-3
TR-4
T-2
155

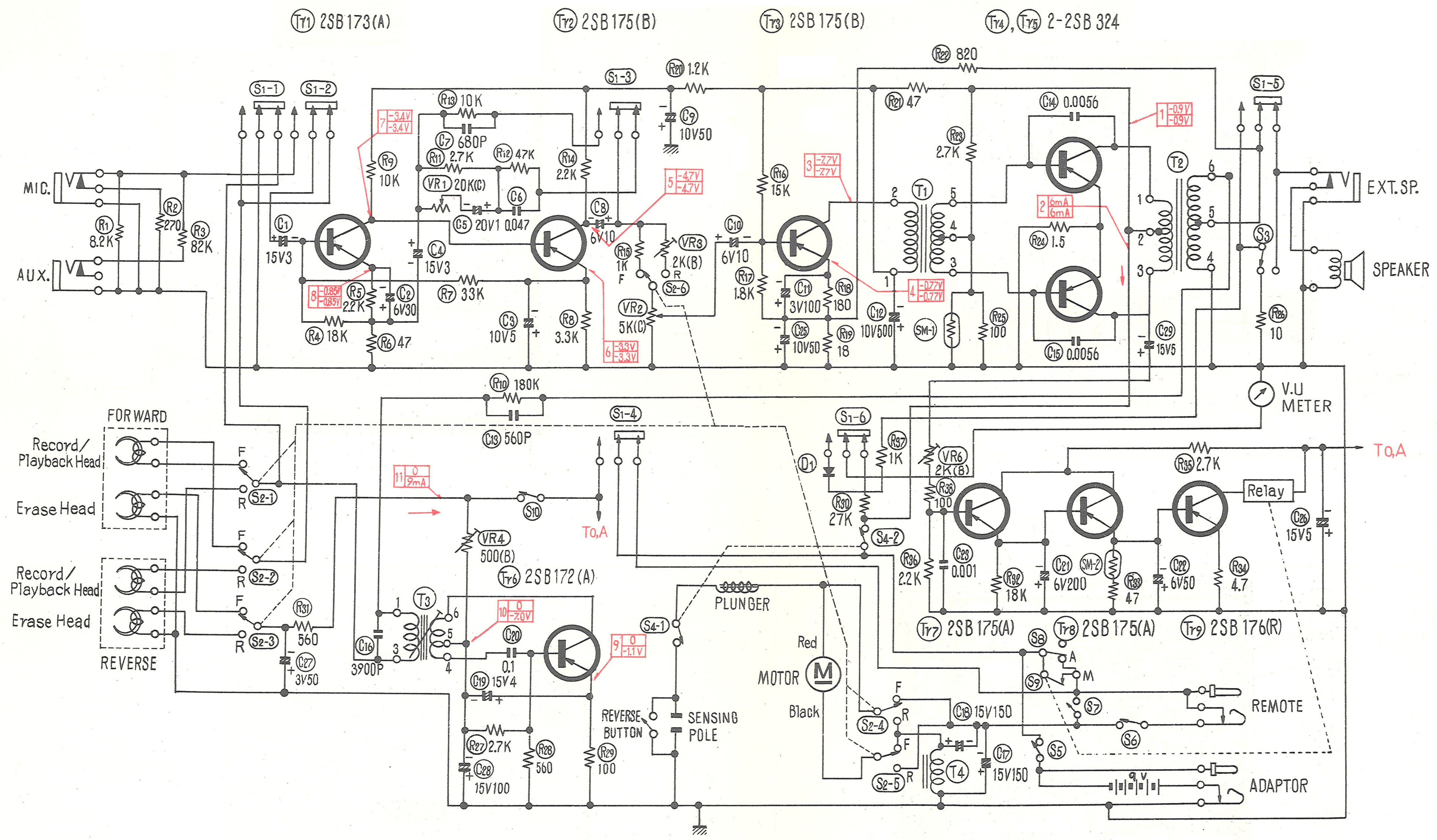
CONDUCTOR VIEW


AUX Jack
MIC REMOTO Jack
AC ADPT. Jack
EXT. SP Jack
R₂280
R₆47
R₁₂47K
C₅50V1
R₉10K
C₄15V3
R₅2.2K
C₂6V30
C₆0.047
R₁₁2.7K
Tr2 2SB175
R₁₄2.2K
C₉10V50
C₃10V5
R₃82K
Tr1 2SB173
R₄18K
C₇680P
R₁₃10K
C₈6V10
R₇33K
R₈3.3K
C₁15V3
S₁-2
S₁-3
S₁-1
R₁₅1K
VR₃2K
R₂₀1.2K
R₁82K
S₁-5
S₁-4
S₁-6
R₃₀27K
R₂₂820
C₁₀6V10
C₁₁3V100
R₁₈180
R₁₉18
C₂₅10V5
Tr3 2SB175
R₁₇1.8K
R₂₆10
C₂₆15V5
R₃₇1K
D₁OA70
R₂₁47
R₁₆15K
C₁₂10V500
T₁
T₂
R₂₄1.5K
Tr4 2SB324
C₁₄0.0056
R₂₅100
SM₁
R₂₃ 2.2~3.9K
C₁₅0.0056
C₁₆3900P
QJ10052
Tr5 2SB324
R₁₀180K
C₁₃560P
R₂₇2.7K
T₃
C₂₀0.1
C₁₉15V4
VR₄500
C₁₇15V150
C₁₈15V150
Tr6 2SB172
T₄
R₂₉100
R₂₈560
C₂₈ 15 V 100
R₃₁560

WIRING CONNECTION DIAGRAM MODEL RQ-158S


Remote Cut-off SW
S7
Instant Stop SW
S6
Monitor
Selector SW
S3
Power SW
S5
Battery
Speaker
V.U Meter
Auto
Manual SW
S8
Auto
Manual
Head
Connection
SW
S2
Motor
Plunger
Sansing
Post
Normal
operation Head
Plunger Power SW
Reverse
Operation Head
S4-1
S4-2
S4
Stop SW
Reverse
Push Button
Midget Power Relay (S-9)
S10
Bias Cut-off SW
VR1
VR2
AUX.Jack
MIC.
REMOTE
Jack
AC ADPT.
Jack
EXT.SP.
Jack
T1
T2
T3
T4
Tr1
Tr2
Tr3
Tr4
Tr5
Tr6
Tr7
Tr8
Tr9
VR3
VR4
VR6
SM-1
SM-2
D1
Green
Blue
Red
Orange
White
Black
Brown

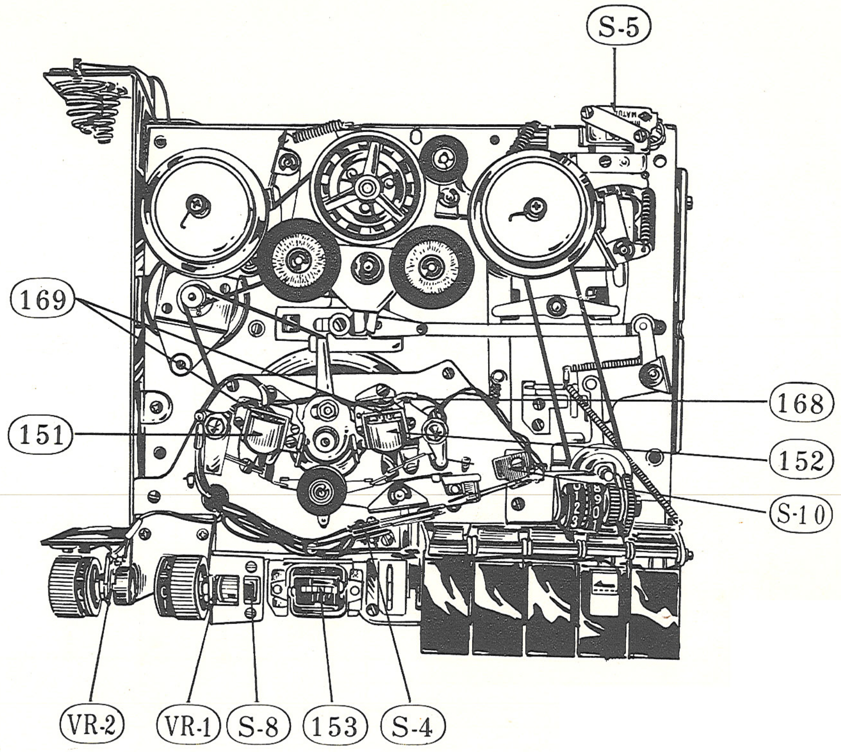
SCHEMATIC CIRCUIT DIAGRAM MODEL RQ-158S

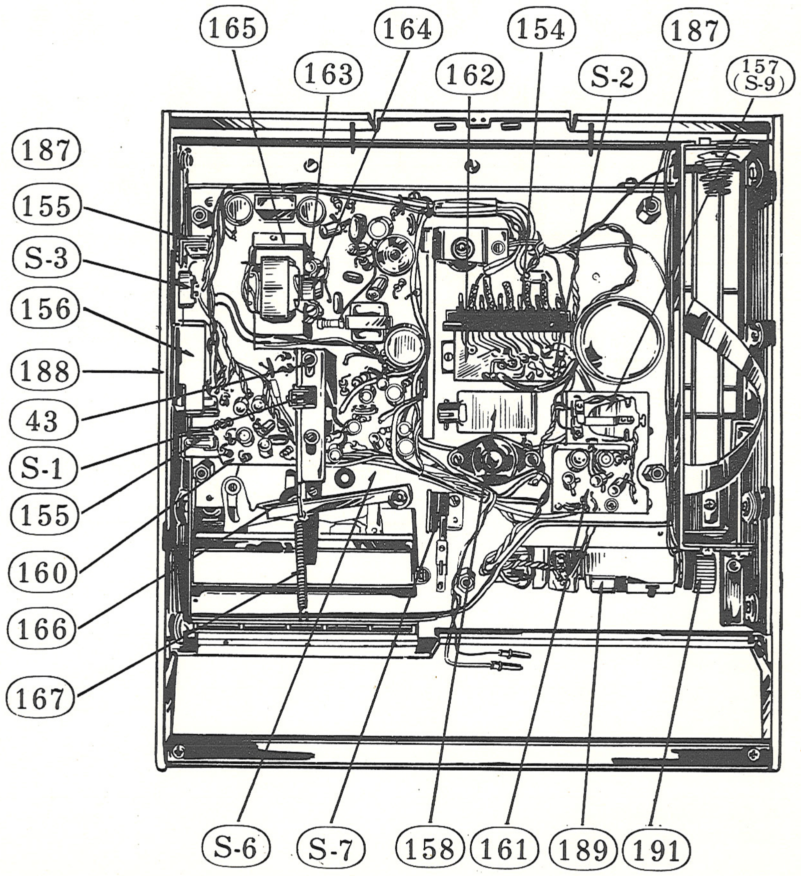

Tr1 2SB173(A)
Tr2 2SB175(B)
Tr3 2SB175(B)
Tr4, Tr5 2-2SB 324
R22 820
R20 1.2K
S1-1
S1-2
S1-3
S1-5
R13 10K
C7 680P
R11 2.7K
R12 47K
R14 2.2K
C9 10V50
R21 47
C14 0.0056
R23 2.7K
T2
7 -3.4V -3.4V
R9 10K
VR1 20K(C)
C6
C5 20V1 0.047
C8 6V10
5 -4.7V -4.7V
VR3 2K(B)
3 -7.7V -7.7V
R16 15K
C10 6V10
T1
1 -0.9V -0.9V
2 6mA 6mA
R24 1.5
MIC.
AUX.
R1 8.2K
R2 270
R3 82K
C1 15V3
C4 15V3
R15 1K
F R
S2-6
R17 1.8K
C11 3V100
R18 180
4 -0.77V -0.77V
EXT.SP.
SPEAKER
S3
8 -0.85V -0.85V
R5 22K
C2 6V30
R7 33K
C3 10V5
R8 3.3K
VR2 5K(C)
6 -3.3V -3.3V
C25 10V50
R19 18
C12 10V500
SM-1
R25 100
C15 0.0056
C29 15V5
R26 10
R4 18K
R6 47
R10 180K
C13 560P
S1-4
S1-6
V.U METER
FORWARD
Record/ Playback Head
Erase Head
Record/ Playback Head
Erase Head
REVERSE
S2-1
S2-2
S2-3
11 0 9mA
S10
To,A
VR4 500(B)
Tr6 2SB172(A)
T3
10 0 -7.0V
C20 0.1
9 0 -1.1V
R31 560
C27 3V50
C16 3900P
C19 15V4
R27 2.7K
C28 15V100
R28 560
R29 100
D1
R37 1K
VR6 2K(B)
R36 100
R30 27K
S4-2
R35 2.7K
Relay
To,A
C26 15V5
R36 2.2K
C23 0.001
R32 18K
C21 6V200
SM-2
R33 47
C22 6V50
R34 4.7
Tr7 2SB175(A)
Tr8 2SB175(A)
Tr9 2SB176(R)
PLUNGER
S4-1
Red
MOTOR M
Black
REVERSE BUTTON
SENSING POLE
S8 A M
S9
S7
REMOTE
S6
S2-4 F R
C18 15V150
S2-5 F R
T4
C17 15V150
S5
9V
ADAPTOR

NOTE:

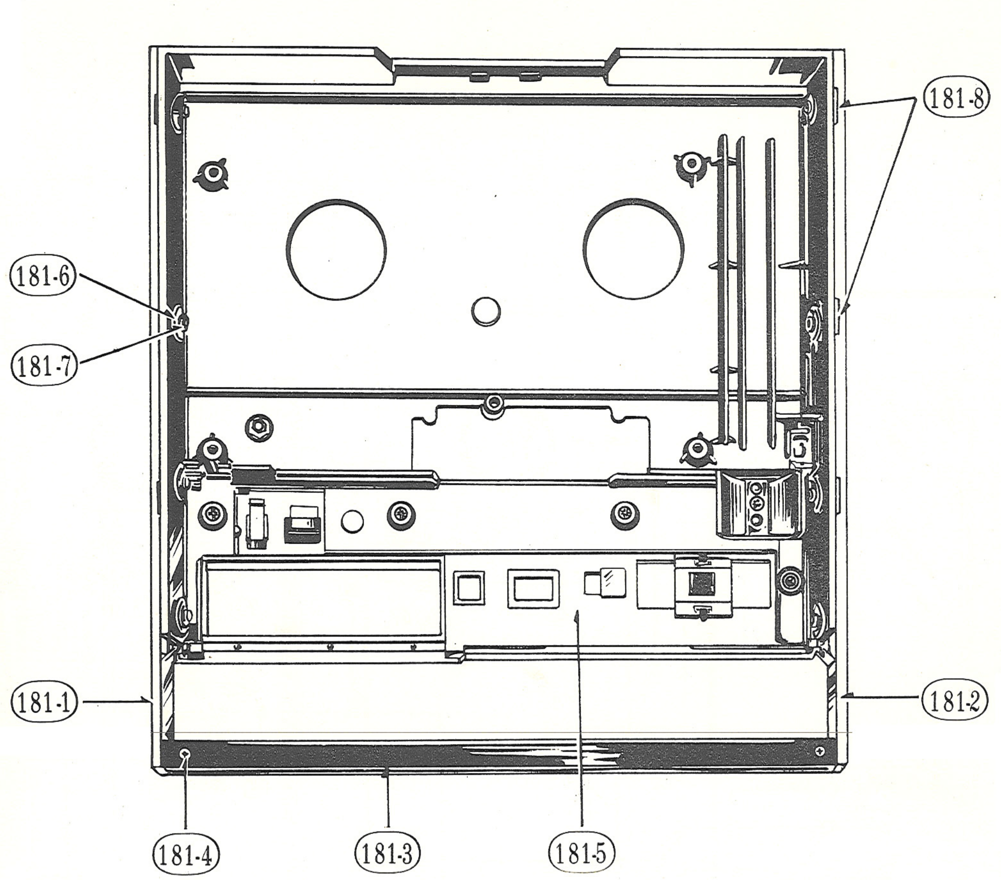
1. S1 .... Record/Playback Selector Switch (shown in playback position)
2. S2 .... Head Selector Switch (shown in normal forward position)
3. S3 .... Monitor Selector Switch
4. S4-1 ...... Plunger Power Switch
5. S4-2 ...... Stop Switch ("OFF" when in F.F. and Rewind modes)
6. S5 .... Power Switch
7. S6 .... Instant Stop Switch
8. S7 .... Remote Cut—off Switch ("ON" when in F.F. and Rewind modes)
9. S8 .... Voice Operation (AUTO/MANUAL) Selector Switch
10. S9 .... Relay contacts
11. S10 ...... Leaf Switch ("ON" when in PLAY and Record modes)
12. All resistance in Ω, 1/4W unless otherwise indicated.
    K=1,000Ω M=1,000,000Ω
13. All capacitance in μF, unless otherwise indicated. P=μμF
14. Values indicated in ▭ are DC to chassis ground with no signal applied.
15. The upper values should be measured during playback and the lower values during recording.

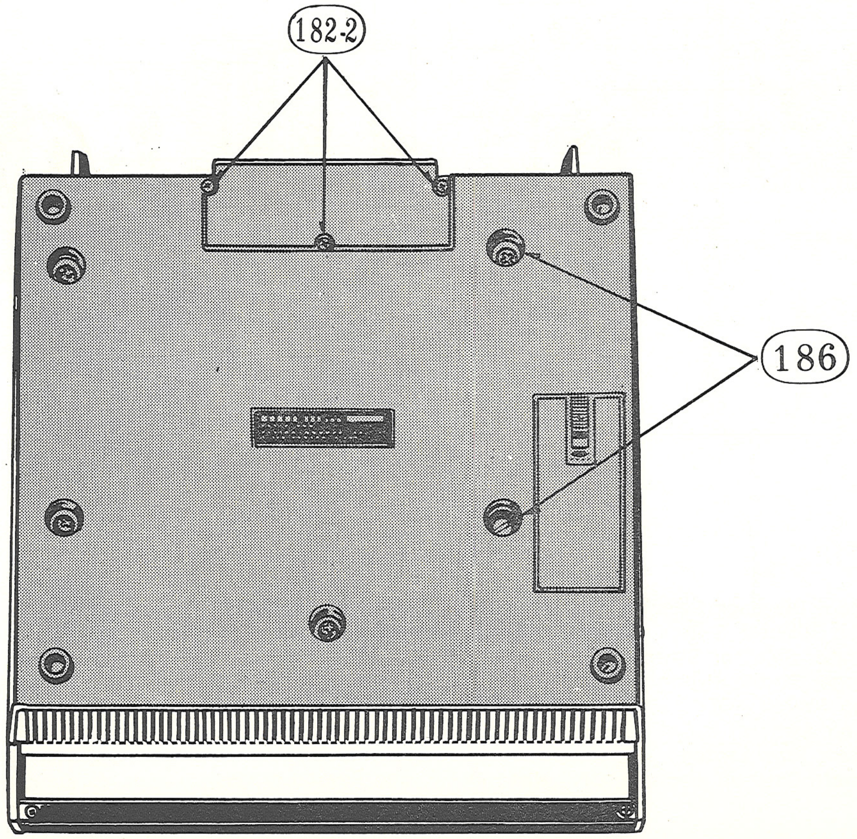
ELECTRIC PARTS LOCATION

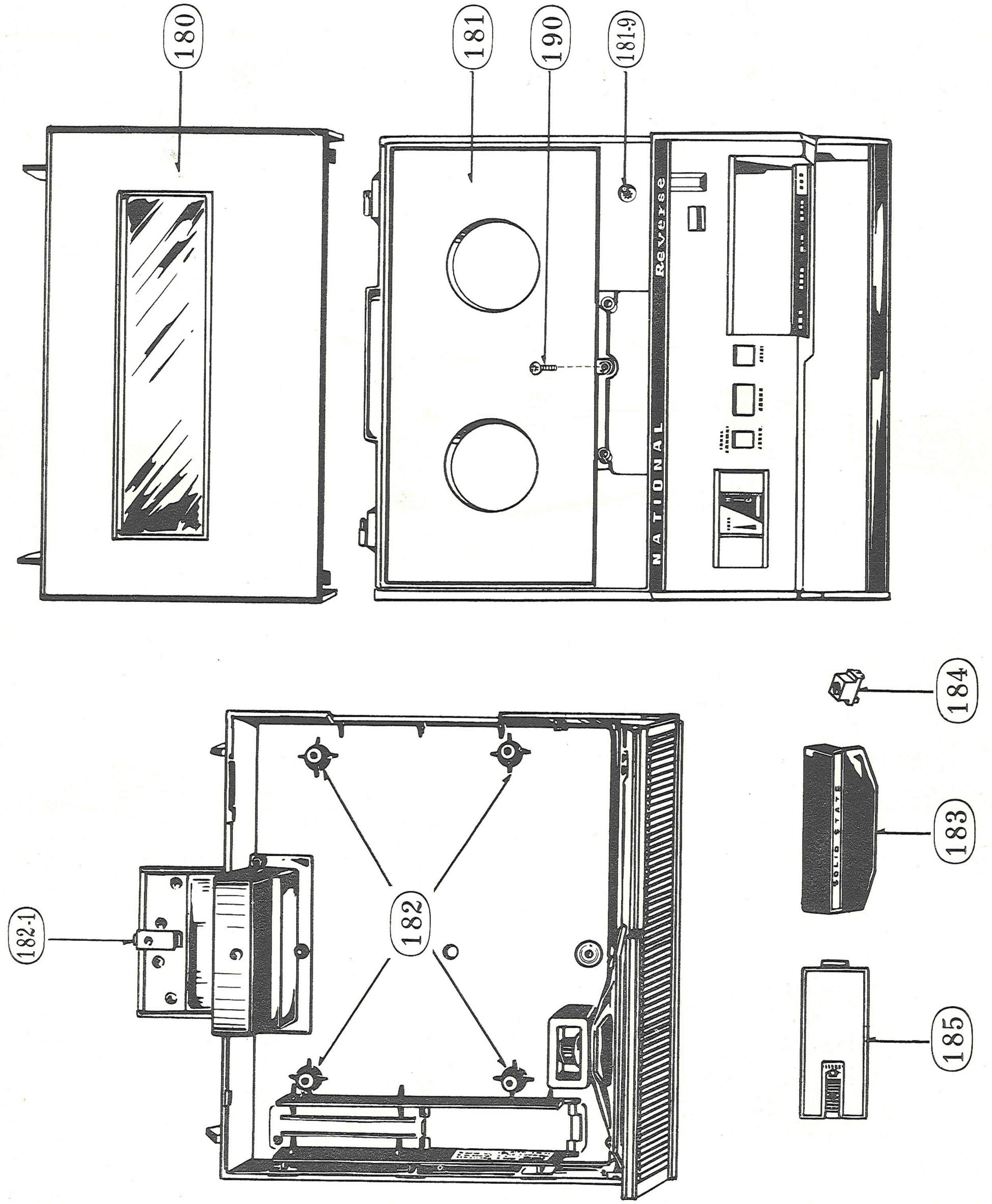

S-5
169
151
168
152
S-10
VR-2
VR-1
S-8
153
S-4


165
164
154
187
163
162
S-2
157
(S-9)
187
155
S-3
156
188
43
S-1
155
160
166
167
S-6
S-7
158
161
189
191

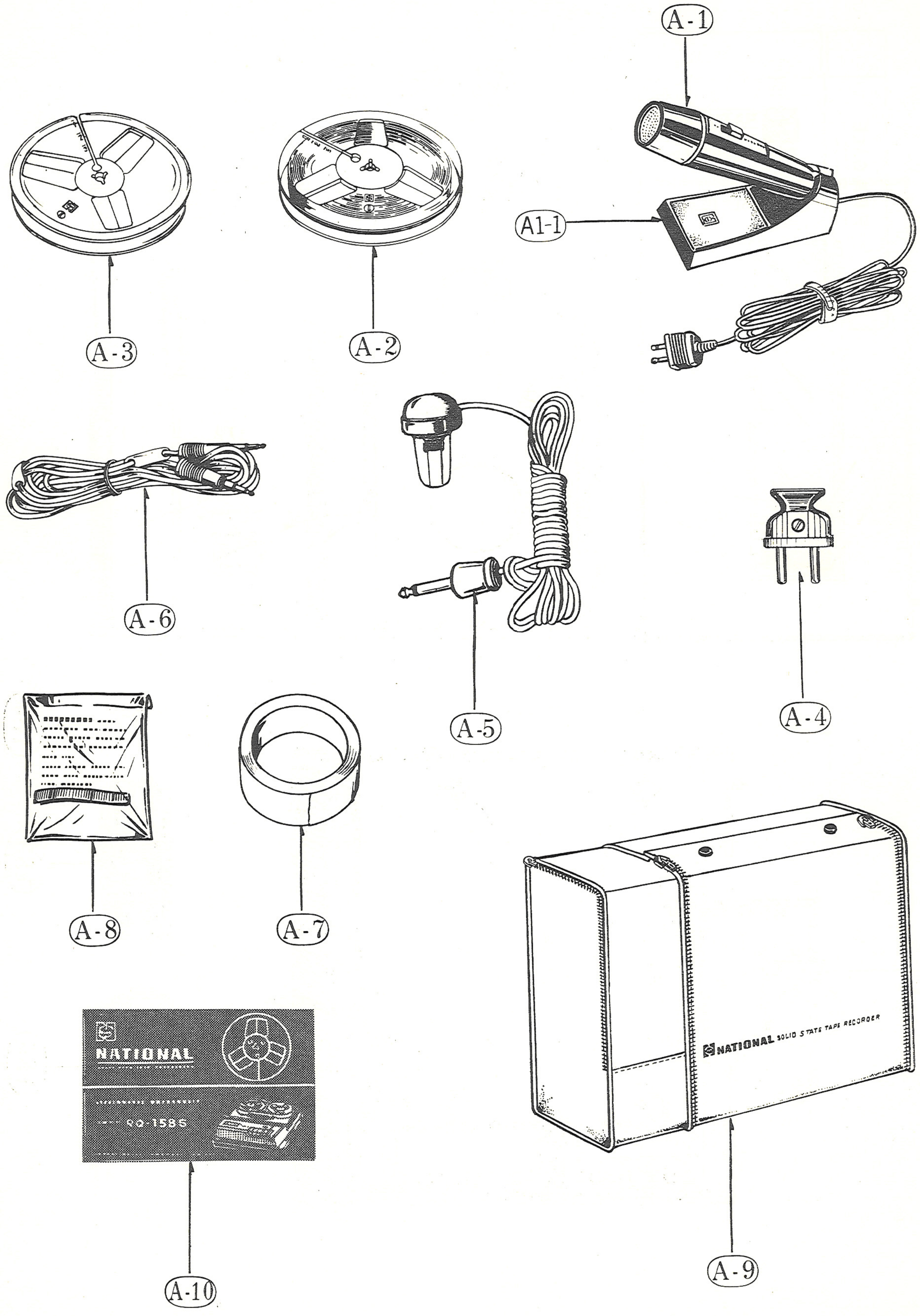
CABINET PARTS


181-8
181-6
181-7
181-1
181-2
181-4
181-3
181-5

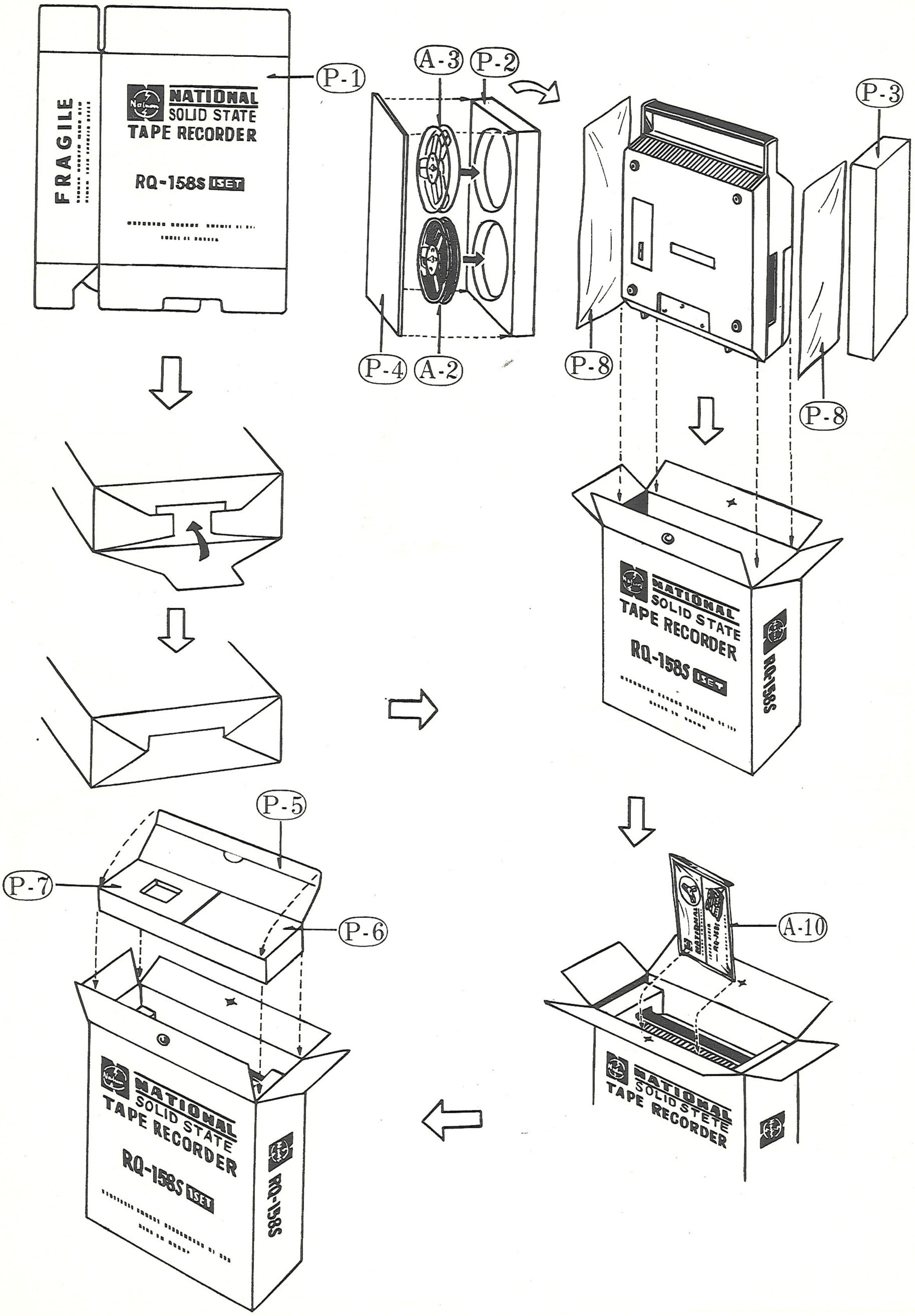



180
181
190
181-9
NATIONAL
Reverse
182-1
182
183
SOLID STATE
184
185

ACCESSORIES


A-1
A1-1
A-3
A-2
A-6
A-5
A-4
A-8
A-7
NATIONAL SOLID STATE TAPE RECORDER
NATIONAL
RQ-158S
A-9
A-10

COMPONENT PACKING


P-1
FRAGILE
NATIONAL
SOLID STATE
TAPE RECORDER
RQ-158S 1SET
A-3
P-2
P-4
A-2
P-3
P-8
P-8
RQ-158S
P-5
P-7
P-6
A-10